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ABSTRACT

Prepared specifically for use in one-week outdoor summer camp programs for migrant children aged 10-15, the twenty bilingual (Spanish and English) educational and recreational activities in the Outdoor Biology Instructional Strategies (OBIS)/Mini-Corps package have been revised to develop language skills as well as an awareness of the outdoor environment. Simulation, observation, experimentation, and numerous games are used to study ants, fish, lichen, plant habitats and distribution, decomposers, water organisms, stalking, and food chains. Each activity is presented in an individual water-resistant folio containing an introduction, materials list, preparation, action, and language development section consisting of discussion activities, language games, and an all-Spanish mini-dictionary. Throughout the package instructions and information for the leader are in English. Headings, key words, materials, and instructions for students are bilingual. The package contains three additional folios which explain fundamental OBIS activity concepts, describe how to use the materials and activities, and give directions for the construction of simple equipment such as dip nets and aquatic observation chambers. Two booklets aid identification of organisms found in and around lawns and ponds. A Spanish version of the same package is also available. (SB)

ED174387

Actividades al Aire Libre

OBIS/MINI-CORPS

Outdoor Activities

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English-Spanish Version
No. 901 R.

RC011588

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WHAT IS OBIS?

Outdoor Biology Instructional Strategies (OBIS) provides learning activities for youngsters in the out-of-doors. Through activities that are both fun and challenging, OBIS offers ten- to fifteen-year-old youngsters biological investigations emphasizing the use of man-managed environments such as city lots, outdoor camps, or neighborhood streams and ponds. These activities may be used independently or sequenced to create a program that suits your needs.

This set of OBIS activities is a special package prepared for the California Mini-Corps camps. Twenty activities have been selected, revised, and translated. As part of the revision we have added a language development section to each activity. The resultant OBIS/Mini-Corps Outdoor Activities provide not only a variety of biology experiences for youngsters in a summer camp environment, but also a resource for incorporating language skills into an outdoor education program. For a description of the language-development opportunities, please refer to the *Leader's Survival Kit* in this packet.

WHY OBIS?

Our relationship with our environment must improve. For too long we have considered ourselves independent of nature; we have taken what we wanted and changed what did not suit our purposes. As we have prospered, medicine and technology have increased our chances of survival. The growing population of humanity has used an ever-increasing amount of the earth's resources. Unfortunately, we have remained uninformed or indifferent to the effects of our increasing demands upon plants, animals, minerals, soil, air, and water. We have now reached a point where we can no longer ignore the ecosystem of which we are a part.

If we are to make intelligent decisions on factors influencing our environment, we must have a thorough understanding of the basic biological relationships. The awareness and understanding that grow with each OBIS experience will create a base that youngsters can use in the future to make informed decisions on environmental issues. This is the long-term goal of OBIS.

IT'S A LIVING WORLD

(We offer here explanations of some of the major concepts embraced by OBIS activities. Explanations are presented here in both English and Spanish. The Spanish text follows the appropriate English information.)

We are part of the ***ecosystem,*** which includes living organisms and the non-living environment. Plants and animals, and their interactions with each other and their environment, all affect the ecosystem in some way. The study of these interactions between organisms and their environments is called ***ecology.***

ES UN MUNDO VIVIENTE

Sabemos que formamos parte del *ecosistema*, constituído por el medio ambiente no-viviente y todos los organismos vivientes. Las plantas, los animales y las interacciones que tienen entre sí, y con su medio ambiente, afectan el ecosistema de un modo u otro. Al estudio de las interacciones que hay entre los *organismos* y su medio ambiente le llamamos *ecología.*

FOOD CHAIN

Energy input to the ecosystem comes from the sun. Through ***photosynthesis,*** plants transform the sun's light energy into food energy. Animals cannot make food; they must obtain their food by eating plants or other animals that eat plants. The energy in the food is transferred from plants to plant eaters and then to animal eaters. This energy transfer is called a ***food chain.***

CADENA ALIMENTICIA

El sol es la fuente principal de energía en el ecosistema. Las plantas por medio de la fotosíntesis transforman la energía solar en energía alimenticia. Los animales, ya que no pueden producir su propio alimento deben obtenerlo comiendo plantas u animales herbívoros. La energía es transferida en el alimento de las plantas a los organismos comedores de animales (carnívoros). Esta transferencia de energía le llamamos *cadena alimenticia.*

NATURAL RECYCLING

When organisms die, their bodies may be eaten by scavengers as diverse as worms and vultures. Plant and animal tissues not eaten by scavengers are consumed by molds, bacteria, and many kinds of small animals. In the process of obtaining food, these organisms decompose the dead organic matter, and eventually reduce it to minerals, water, and carbon dioxide. These materials, returned to the earth, water, and atmosphere, can then be used again by plants to produce food.

RECICLO NATURAL

Cuando los organismos mueren sus cuerpos son consumidos por los diversos animales basureros (animales que se alimentan de organismos descompuestos o carroña) desde lombrices hasta buitres. Los residuos de plantas y animales que no son

comidos por los organismos basureros, son consumidos por el moho, las bacterias u otras clases de animales diminutos. Al consumir su alimento, estos organismos descomponen la materia orgánica hasta reducirla a minerales, agua, y dióxido de carbono. Estos materiales enriquecen la tierra, el agua y la atmósfera en donde son utilizados de nuevo por las plantas para producir su alimento.

POPULATIONS AND COMMUNITIES

Each group of organisms of the same kind, such as field mice, that live and reproduce in a particular area is a ***population.*** Populations of plants, of plant eaters, of animal eaters, of scavengers, and of molds and bacteria live together and depend on each other for food and protection. Such a combination of interdependent populations is called a ***community.***

Communities differ depending on their locations. A pond community consists of different kinds of plants and animals adapted for living in a pond. The populations living together in oceans, tidepools, lakes, streams, meadows, prairies, deserts, and forests all represent communities that differ according to the physical surroundings ***(physical environment)*** in which they live, and the populations of plants and animals (the ***biological environment)*** living there. The lawn that surrounds your house contains a community of plants and animals as does the city park or vacant lot. You do not have to travel long distances into the "wilds" to find natural communities.

POBLACIONES Y COMUNIDADES

Un conjunto de organismos de la misma clase (p.ej. los ratones del campo) que viven y se reproducen en una misma región, constituyen una *población.* En el ecosistema las poblaciones de plantas, organismos herbívoros, carnívoros, organismos basureros, moho y bacteria, conviven y dependen una de la otra para su alimentación y protección. A esta combinación de poblaciones interpendientes le llamamos *comunidad.*

Las comunidades difieren dependiendo de su localidad. Por ejemplo, la comunidad de un estanque o charco está formada por las diferentes clases de plantas y animales adaptados para vivir en agua estancada. Las poblaciones que se encuentran en los océanos, aguas estancadas de mar, lagos y arroyos, praderas y llanos, desiertos y bosques, representan comunidades diferentes; difirendo de acuerdo a lo que las rodea (el *medio ambiente físico)* y las otras poblaciones de plantas y animales (el *medio ambiente biológico)* con las que conviven. En el jardín que rodea una casa hay una comunidad de plantas y animales, lo mismo que en un parque urbano o en un terreno baldío; uno no tiene que ir al campo o a un área silvestre para encontrar una comunidad natural.

ADAPTATION

Adaptations are special features or behaviors that improve an organism's chances of surviving and reproducing in a particular environment. Some animals display color adaptations that allow them to blend into their surroundings, thus avoiding capture. Other adaptations improve the ability of plants and animals to secure food, reproduce, and defend themselves. An animal that is adapted to extract oxygen from water, has fins, and can tolerate relatively warm water, might be expected to live in a shallow pond habitat. An organism's ***habitat*** is the place where an organism usually lives and where you would ordinarily go to find it. A plant that can withstand high temperatures and a low-moisture environment might be found in an arid habitat like a desert.

If a habitat undergoes a radical change as a result of natural catastrophe (flood, fire, landslide, drought) or the intervention of man (land clearing, swamp draining, construction), the new environmental conditions may no longer support the varieties of life that were previously present. Many organisms will therefore die. Some plants and animals that existed in the old environment may already have special features or characteristics (adaptations) that will allow them to exist in the new environment. Organisms previously unable to live in a certain habitat may now colonize it because the environment of that habitat has changed. These first colonizers may not be adapted to compete with some of the organisms that follow later. Many fail and are replaced by still other organisms.

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ADAPTACIÓN

Las *adaptaciones* son las características o comportamientos especiales de un organismo que le permiten sobrevivir y reproducirse en un cierto medio ambiente. Por ejemplo, algunos animales presentan adaptaciones en forma de color que les permite combinarse con las cosas que los rodean y así evitar ser capturados. Otros tipos de adaptaciones facilitan a las plantas y animales la obtención de su alimento, su reproducción y su defensa. Un animal adaptado para extraer oxígeno del agua, con aletas y capaz de tolerar relativamente agua templada, está capacitado para vivir en un medio de agua estancada no muy profundo. El *medio* o *habitat* de un organismo es el lugar donde el organismo vive normalmente y donde uno lo puede encontrar. Por ejemplo, una planta adaptada para resistir altas temperaturas y un clima seco puede sobrevivir en un medio árido como el desierto.

LIFE CYCLE

Every species must reproduce in order to perpetuate its kind. The process by which an organism comes into being, matures, and reproduces is called the ***life cycle.*** Some life cycles are short, as in the case of a mosquito which may go through its life cycle in a matter of a few days. Other life cycles are long, such as those of some trees that take years to mature and reproduce.

CICLO DE VIDA

Cada especie debe reproducirse para perpetuarse. El proceso por el cual un organismo nace, madura y se reproduce es llamado *ciclo de vida*. Algunos ciclos de vida son cortos, como el caso del mosquito que puede tener un ciclo de vida completo en unos días mientras que otros son largos, como el caso de los árboles que les toma años madurar y reproducirse.

HUMANS

One organism that influences every ecosystem is man. Humans have technology, which enables them to survive in a wide range of environments and to gain dominance over many other life forms. Because of man's special abilities, he must assume responsibility for the consequences of his actions.

It is clear that the time has come for worldwide adoption of sensible management practices derived from an understanding of the ecosystem. OBIS provides one avenue for young people to develop this understanding.

SERES HUMANOS

Un organismo que afecta todos los ecosistemas es el hombre. Los seres humanos poseen la tecnología que les permite sobrevivir en muchos tipos de medios ambientes y tomar dominio sobre otras formas de vida. Debido a esta habilidad especial, el hombre es responsable de las consecuencias de su influencia en la naturaleza.

Es tiempo que el mundo adopte normas sensatas de conservación basadas en buen entendimiento del ecosistema. OBIS es un medio que ampliará este conocimiento a los jóvenes.

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These activities were adapted from activities in OBIS Trial Editions Set I, Set II, and Set III.

A Component of the California Plan for the Education of Migrant Children
E.S.E.A., Title 1, P.L. 93-380

The OBIS/Mini-Corps Outdoor Activities [Actividades al Aire Libre de OBIS/Mini-Corps] package has been prepared with a specific educational setting in mind: a one-week outdoor summer camp for migrant youngsters aged nine to fourteen. This package presents an educational and recreational program designed to develop the youngsters' language skills as well as their awareness of their outdoor environment.

OBIS activities give the youngsters hands-on experiences with the plants and animals living around them. In addition, the activities present biological concepts that lead the youngsters to a better understanding of their ecological system.

LANGUAGE OPPORTUNITIES

The OBIS/Mini-Corps package contains twenty OBIS activities that have been revised to bolster the language development opportunities inherent in each activity. Thus, these revised activities provide a variety of biology experiences for youngsters in their summer camp environment and also a resource for incorporating language skills into an outdoor educational program.

This package is available in two versions: a complete Spanish translation and this practical bilingual adaptation. This dual method of presentation was adopted to provide maximum flexibility for the wide range of language situations within migrant education. This bilingual version may prove to be the most practical for bilingual leaders. The instructions to the leader are in English, while the key terms and instructions for the children appear in both English and Spanish. Most of the Spanish terms and instructions are enclosed in brackets and immediately follow their English equivalents. Key terms appear in ***bold italics,*** while statements that the leader may wish to quote directly to the youngsters appear in **bold type.** Even when the English text gives indirect instructions (i.e., "Tell the youngsters to put on their masks."), the Spanish translation that follows is a direct instruction to the youngsters: **[Pónganse las máscaras** (put your masks on)**].**

THE ACTIVITIES [LAS ACTIVIDADES]

The OBIS/Mini-Corps package contains the following twenty activities:

Adaptation — Predator-Prey [Los Animales Rapaces]. By creating and sharing predator devices, the children discover the types of structures animals use to "capture" and eat food.

Animal Movement in Water [Animales que Nadan]. The youngsters observe different aquatic organisms and try to discover which structural features are involved in each animal's form of movement.

Ants [Las Hormigas]. The youngsters discover "super food" and use it to investigate ant behavior.

Attract a Fish [Atrae a los Peces]. The youngsters "fish" with a variety of potential baits and lures to explore the behavior of minnows.

Envirolopes [Ambientándonos]. Envirolope challenges direct the youngsters to hunt for a variety of colors, textures, odors, and evidence of organism interactions in their activity site.

Food Chain Game [La Cadena Alimenticia]. By assuming the roles of hoppers, frogs, and hawks, the youngsters investigate feeding relationships in a simulated food chain.

Gaming in the Outdoors [Jugando al Aire Libre]. The youngsters go on a hunt and learn about the variety in their environment.

Hold It [Deteniéndose]. After making a cork or sponge "creature" that can hold on against water currents, the youngsters investigate the holding adaptations of real organisms.

Invent an Animal [Inventa un Animal]. After designing animals that are camouflaged to blend into a specific habitat, the youngsters search for each others' camouflaged animals.

Invent a Plant [Inventa una Planta]. The youngsters construct models of plants adapted for different environmental conditions.

Lichen Looking [Observando Líquenes]. The youngsters search for lichens and examine their habitats, shapes, and colors.

Litter Critters [Bichos en la Hojarasca]. The youngsters search for small animals in the natural ground litter, and then re-create their catches on their OBIS Litter Critter Wheels.

Plant Hunt [La Búsqueda de Plantas]. An exploratory hunt for plants familiarizes youngsters with the diversity of plants in a selected site. The concept of ***species*** is introduced.

Plant Patterns [Arreglo de Plantas]. By mapping the location and abundance of plants in an area, the youngsters discover the distribution patterns of the plants.

Roots and Shoots [Tallos y Raíces]. The youngsters dig up weeds and compare their roots with the roots of "mystery plants."

Seed Dispersal [Dispersión de Semillas]. The children modify beans or peas to simulate the mechanisms of seeds and plants that allow for their dispersal to better growing sites.

Silent Stalking [Cazando al Acecho]. The youngsters play a game in which they explore the importance of sound to both the stalking predator and the prey being stalked.

Sound Off! [Haciendo Sonidos]. In this game, the youngsters investigate animal communication by using noise-makers and their sense of hearing to find a secret partner before being captured.

Sticklers [Palillines]. This simulation game introduces youngsters to ways in which organisms are distributed in their habitat.

What Lives Here? [¿Quiénes Habitan Aquí?]. In this introductory activity, the youngsters observe and identify plants and animals that live in an aquatic site.

USING OBIS MATERIALS

OBIS activities are easy to use, but for the best results, the OBIS leader must be prepared. This folio provides a few tips on making your OBIS experiences run smoothly.

PREPARATION

Read the Activity Folio. Make sure you know what the activity involves. Overlooking procedures and preparation may slow down the activity process.

Check the Materials. OBIS activities generally do not call for a lot of hardware. However, the equipment that is listed is essential to the success of an activity. Gather the necessary materials, prepare data boards, "make sure your felt pen has ink," and organize the equipment for easy transport to your study site.

Select a Site. Select the site that is most appropriate for the activity you have chosen. If necessary, mark the limits [límites] of the site by placing bright markers on trees or on the ground.

Limit the Group Size. OBIS activities use the discovery approach to learning. This approach calls for small groups that allow for informal interaction between the leader and the youngsters. The youngsters are not *shown* or *told*, but are placed in situations where they can *find out for themselves*. For most activities, the size of the group should not exceed twelve youngsters. This maximum number eliminates most management problems, but still provides a group large enough to stimulate peer interaction.

ACTION

Jump In! When you arrive at the activity site with your group, give a brief introduction and start the Action. The key to these activities is participation, *not* listening. If some youngsters are not clear on the procedures, get started anyway. While the group is working, you can help those having difficulty.

Timing. Although determining when to wrap up an activity is sometimes difficult, try to keep the activity moving at a fast pace; *don't* let the action continue until the youngsters are bored. On the other hand, if the activity is generating more interest than you had anticipated, let it continue as long as possible, even at the expense of disrupting your predetermined schedule.

Discussing the Activity. The discussion questions should follow immediately after the direct experience in the environment. Keep the discussion going, but don't compromise the full potential of such a discussion by going through it too fast. Learn to "read" your group to determine when enough is enough, and when more is appropriate.

LANGUAGE DEVELOPMENT

OBIS activities provide experiences with biological ideas in the outdoors. In addition, the OBIS/Mini-Corps package has incorporated a section to enhance language skills as well. The "Language Development" section contains three components:

1. **Discussion Section.** This section contains a series of questions designed to encourage the youngsters to verbalize their experience with OBIS.

2. **Language Games.** This section attempts to "capture" the wide range of mechanical and expressive aspects of language through mini-lessons in writing, spelling, speaking and even some acting. The premise in this section is Language + Fun = Learning.

3. **Mini-Dictionary.** The key science terms presented in the activity and their definitions in Spanish are listed at the end of each activity, allowing for easy reference.

The "Language Development" section in each activity has been designed to enhance language opportunities stemming from biological investigations. Please allow enough time to take advantage of the language opportunities.

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SAFETY [SEGURIDAD]

The safety of your group is a prime consideration. In order to insure safety, OBIS designs equipment and procedures to be as safe as possible. In addition, OBIS recommends that leaders organize a Buddy Safety System when participants explore an aquatic or other potentially hazardous site. As a precaution, you may wish to bring along a First Aid kit.

Buddy Safety System [Sistema de Seguridad de "Compañeros"]. The Buddy Safety System is designed to insure that no participant will ever be far from assistance should it be needed. Group members each choose a buddy that they would like to work with. For an odd-numbered group, organize one team of three buddies. When the youngsters are paired off, tell them that each individual is responsible at all times for the whereabouts and safety of his buddy. A participant should never leave his buddy unless his own safety is threatened. In the event of an accident to one buddy, the other should render assistance and call for help. **[Si algún niño tiene un accidente, el compañero deberá tratar de ayudarlo y avisar al instructor.].**

Other Hazards. Avoid aquatic sites with obvious hazards such as steep banks and slide areas. Look for a site with gently sloping banks for easy water access and unobstructed vision for easy supervision.

CONSERVATION — TAKE 'EM BACK ALIVE! [¡QUE REGRESEN SANOS Y SALVOS!]

Your youngsters should understand that no organisms should be permanently removed from their habitats. **[Ningún organismo es quitado permanentemente de su medio.]** OBIS users collect organisms temporarily for observation and investigation, but all should be returned to the place where they were found. (Leaf samples are an occasional exception.) The overall impact of your group on an activity site should be minimal. Setting some rules of procedure will help to emphasize respect for the activity-site environment.

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Whenever you find a group of animals and plants living together (a community [una comunidad]), you will always find predators and their prey. ***Predators*** **[*animales rapaces* o *depredadores*]** are animals with adaptations that enable them to capture and eat their prey. An ***adaptation*** **[*adaptación*]** is any special feature of a plant or an animal that improves its chances of surviving and reproducing. The ***prey*** **[*presas*]** are the live animals or plants that are captured and eaten for food. In this activity the special adaptations predators use for capturing and devouring their prey are called ***predator devices*** **[*artimañas del animal rapaz*]**.

OVERVIEW

For this activity the youngsters will use craft materials and some imagination to fabricate predator devices that might help an animal capture a specific kind of prey. After constructing the devices, the youngsters play a descriptive guessing game to determine the function of the predator devices.

CHALLENGE: CREATE PREDATOR DEVICES THAT CAN CATCH AND PICK UP PREY. BE CAREFUL NOT TO INJURE ANY LIVING PLANTS OR ANIMALS.

RETO: CONSTRUYE UNA ARTIMAÑA DE ANIMAL RAPAZ COMO PARA PODER ATRAPAR Y RECOGER PRESAS. TEN CUIDADO DE NO DAÑAR LAS PLANTAS Y LOS ANIMALES.

MATERIALS

- toothpicks
- popsicle sticks
- rubber bands
- glue
- transparent tape
- string
- pins
- round-head paper fasteners
- cardboard
- wire
- pipe cleaners
- natural materials [materiales naturales] found at study site

1 data board (See the *OBIS Toolbox* folio).
1 marking pen
1 regular sheet of paper

PREPARATION

Mark off a grid [unos cuadros] on the data board.

Number the squares up to the number of kids doing the activity. Write the same numbers on some small scraps of paper and put them in a hat, bag, or pocket. These numbered scraps and the date board chart will be used in the "Language Activity."

ACTION

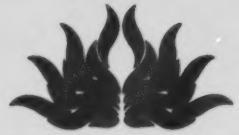
(Note: Read #4, "A language opportunity," in this section before carrying out the activity.)

1. Take the group to an outdoor study area such as a field, streamside, lawn, or wooded area. Ask the participants to locate any living materials in the plot that might be prey [presa] for animals living in or passing through the area. For example: seeds, eggs, roots, vegetation, insects, slugs, worms, mice, and other organisms might be prey. **[Por ejemplo, semillas, huevos, raíces, vegetación, insectos, gusanos, babosas, ratones o cualquier otro organismo, podrían ser presas.]** Send the kids out to gather a few samples.

2. Call the youngsters back to compare their finds. Ask the participants to talk about predator devices such as claws, beaks, and jaws, which predators might use to capture the prey they have found **[¿Qué artimañas necesitarían tener los animales rapaces para capturar las presas que encontraron y recogieron? ¿Garras, picos, quijadas?]**

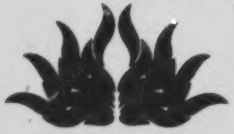
LOS ANIMALES RAPACES
Tarjeta de Acción

Haz una artimaña como la que usaría un animal de rapiña para recoger un huevo.



LOS ANIMALES RAPACES
Tarjeta de Acción

Haz una artimaña como la que usaría un animal de rapiña que fuera carnívoro.



LOS ANIMALES RAPACES
Tarjeta de Acción

Haz una artimaña como la que usaría un animal de rapiña para quebrar y comer nueces.

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LOS ANIMALES RAPACES
Tarjeta de Acción

Haz una artimaña como la que un animal de rapiña usaría para cazar animales que viven por debajo de la tierra.

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PREDATOR PREY
Action Card

Make a predator device for breaking nuts and eating the meats.

PREDATOR PREY
Action Card

Make a predator device for getting at animals that live underground.

PREDATOR PREY
Action Card

Make a predator device that could catch or pick up an egg.

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PREDATOR PREY
Action Card

Make a predator device that a meat eater would use.

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LOS ANIMALES RAPACES
Tarjeta de Acción

Haz una artimaña como la que usaría un animal de rapiña para recoger hojas.

LOS ANIMALES RAPACES
Tarjeta de Acción

LOS ANIMALES RAPACES
Tarjeta de Acción

Haz una artimaña como la que usaría un animal de rapiña para atrapar un insecto volador.

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LOS ANIMALES RAPACES
Tarjeta de Acción

Haz una artimaña como la que necesitaría un animal de rapiña para escarbar la tierra y encontrar raíces.

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PREDATOR PREY
Action Card

Make a predator device that could catch a flying insect.

PREDATOR PREY
Action Card

Make a predator device that could dig up roots.

PREDATOR PREY
Action Card

Make a predator device that could pick up leaves.

19

PREDATOR PREY
Action Card

20

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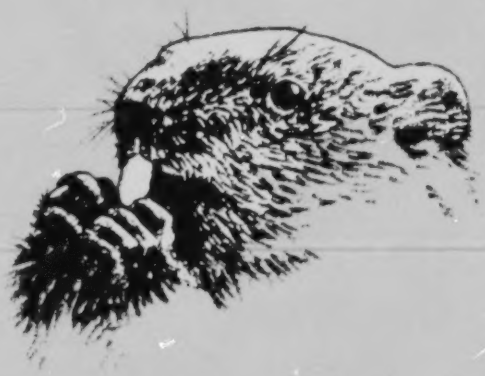
3. Give each participant one Action Card [**Tarjeta de Accion**]. Each youngster should try to make a predator device that meets the challenge on his card using the materials you have provided and whatever he can find "on location" at the study site.

Action Cards [Tarjetas de Accion]

- ☐ Make a predator device that could pick up an egg.
  Haz una artimaña como la que usaría un animal de rapiña para recoger un huevo.
- ☐ Make a predator device that could catch a flying insect.
  Haz una artimaña como la que usaría un animal de rapiña para atrapar un insecto volador.
- ☐ Make a predator device that could dig up roots.
  Haz una artimaña como la que necesitaría un animal de rapiña para escarbar la tierra y encontrar raíces.
- ☐ Make a predator device that could pick up leaves.
  Haz una artimaña como la que usaría un animal de rapiña para recoger hojas.
- ☐ Make a predator device for getting at animals that live underground.
  Haz una artimaña como la que un animal de rapiña usaría para cazar animales que viven por debajo de la tierra.
- ☐ Make a predator device that a meat eater would use.
  Haz una artimaña como la que usaría un animal de rapiña que fuera carnívoro.
- ☐ Make a predator device for breaking nuts and eating the meats.
  Haz una artimaña como la que usaría un animal de rapiña para quebrar y comer nueces.



4. **A language opportunity.** Take advantage of informal conversation during the construction period. Try to keep the discussion on the topic of predator devices and related subjects. Ask the youngsters:

a. What animals might use the device you are making?
   ¿Qué animal de rapiña podría usar la artimaña que estás haciendo?
b. What do you think the animal gets with that _____ (device)?
   ¿Qué cosa crees que el animal de rapiña obtenga o coma con esa _____ (artimaña)?
c. If your animal lived by a pond, what would it catch to eat? If it lived by the sea? In a desert? In the city? In a forest?
   Si un animal vive cerca de un estanque, ¿qué crees que pueda cazar ahí para alimentarse? ¿si vive en la ciudad? ¿en el bosque?

5. After the youngsters have fabricated their predator devices, send everyone back into the site to look for predators (lizards, frogs, snakes, fish, insects with big jaws, and birds [lagartijas, ranas, víboras, pescados, insectos o pájaros]) and to decide what kind of prey they are adapted to eat. Also ask the youngsters to look for ***evidence* [*evidencia*]** that predators have been at work in the area (bones, feathers, droppings with fur, bark ripped from trees, etc. [huesos, plumas, pedazos de piel, corteza arrancada de los árboles, etc.]).

LANGUAGE DEVELOPMENT

WHAT DO YOU THINK?

1. Why are there so many different kinds of predator devices?
   ¿Por qué creen que hay tantos tipos diferentes de artimañas de animal rapaz?

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2. What would happen if every animal had the same predator device?
¿Qué pasaría si todos los animales de rapiña poseyeran el mismo tipo de artimaña?

3. What adaptations do prey have that help them avoid being eaten by predators?
¿Qué adaptaciones tienen las presas que les ayudan a no ser capturadas y devoradas?

LANGUAGE ACTIVITY

After the youngsters finish their devices, let each youngster place his creation in one of the numbered squares on the data board grid. Each youngster should then draw a numbered scrap from the bag. (If a youngster draws the number of his own predator device, let him draw again.) Now call on the youngster holding #1 to pick up the device in square #1 and explain to the group: (1) what kind of predator uses such a device **[qué tipo de animal de rapiña (depredador) usa esa artimaña]**, and (2) what kind of prey that animal might capture with the device **[qué tipo de presa puede capturar el animal de rapiña con esta artimaña].**

When the first youngster is through with his description of the first predator device, have the creator of that device step up and describe the predator and the prey for which the device was designed. Continue until all the devices have been explained.

MINI-DICTIONARY

predator or
animales rapaces o ***depredadores:*** los animales que capturan plantas y animales vivientes para su alimentación.

prey or
presas: las plantas y los animales vivientes que son capturados y devorados como alimento.

adaptation or
adaptación: cualquier característica especial de la planta o del animal que le aumenta las probabilidades de supervivencia y reproducción.

predator device or
artimañas del animal rapaz: las adaptaciones especiales que tienen los animales para atrapar y devorar a sus presas.

For most animals, movement is necessary for survival. Survival of individual animals and their own kind depends on movement, which allows animals to obtain food and to mate before they are eaten. An animal's type of movement varies according to that animal's needs for survival. For example, a fish has fins and a bird has wings for moving from place to place. A frog lies quietly in wait for its prey, while a mosquito fish takes active pursuit.

Aquatic animals are particularly fascinating because they have such a variety of structures and behavior that enable them to move through the water. Such structures are called adaptations. An ***adaptation [adaptación]*** is any special feature of an ***organism [organismo]*** that improves its chances of surviving and reproducing.

CHALLENGE: DISCOVER HOW SOME AQUATIC ANIMALS MOVE THROUGH WATER.

RETO: DESCUBRE CÓMO SE MUEVEN LOS ORGANISMOS ACUÁTICOS A TRAVÉS DEL AGUA.

OVERVIEW

In this activity, the youngsters each select an aquatic animal to investigate. Each participant places his animal in a container filled with clear water and, by observing its behavior, tries to discover which structural features are involved in the animal's form of movement. Each youngster continues his investigations by noting the animal's responses to other organisms and non-living objects taken from its environment. Following these investigations, the youngsters are introduced to the concept of ***adaptation [adaptación]***.

MATERIALS

For each buddy team of two:

1 *Pond Guide*
2 bug boxes or magnifying lenses *
2 clear-plastic bags or drinking cups*
2 spoons*
1 white-bottomed container such as a dishpan or a milk carton opened on one side*
1 dip net*

*See the "Aquatic Observation Aids" card in the *OBIS Toolbox* folio.

PREPARATION

Select a pond or section of a pond where the sides are not too steep or slippery. Plan and institute a buddy system in which each student assumes responsibility for his or her teammate.

ACTION

1. Divide the group into teams of two. Explain the importance of the buddy system [sistema de "compañeros"]. Describe the boundaries [límites] of the study site.

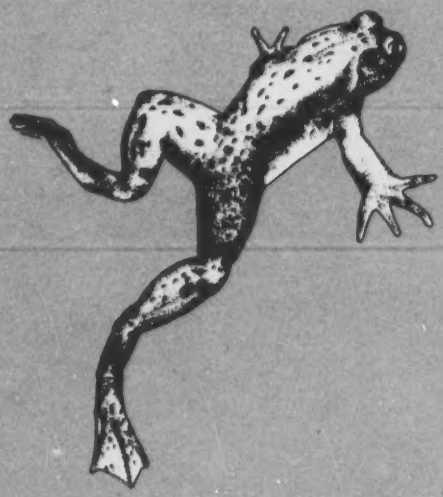
2. Tell each team to use a dip net to capture two pond animals for temporary observation. **[Cada equipo atrapará con una pequeña red dos animales del estanque para observarlos por un rato.]**. Each member of a team should study a different organism.

3. Each participant places his animal in a white-bottomed container [envase de fondo blanco] filled with clear pond water. He can use a plastic spoon to transfer small animals into clear plastic cups for close viewing. Bug boxes [cajitas de bichos] are useful for observing very tiny animals or small parts of animals.

4. Call the teams together. Tell the youngsters to set the containers in the shade and to observe their animals' movements. Each participant should note his animal's general form of movement. Does it crawl, wiggle, swim, or skate along the surface? Which structures enable the animals to move? **[Coloquen los envases en la sombra para observar a los animales acuáticos. Cada quién debe examinar la forma general de movimiento de su animal. ¿Cómo se mueve el animal? ¿Se arrastra, se menea rápidamente, nada, o patina por la superficie? ¿Qué estructura le permite hacer esto?]**

5. To expand the investigation, each youngster can manipulate the environment in his water-filled container by adding various physical objects such as small rocks or sticks (not mud, since it clouds the water). Other organisms can also be introduced into the environment. The objects and additional organisms should be added one at a time so that the animal's reaction to each addition can be observed. Observations are usually more interesting if non-living objects are added first, followed by plants and animals taken from the actual environment of the animal. **[Pueden modificar el medio ambiente de su recipiente, añadiendo uno por uno, algunos objetos físicos u otros organismos. Es mejor poner los objetos físicos primero, después las plantas y al último otros animales tomados del mismo ambiente.]** Care should be taken to minimize handling and jarring of the animal.

6. Remind the youngsters that animals are only removed from the pond temporarily; after observation the animals should be returned to their source. **[Los animales son usados sólo temporalmente y cuando la investigación se termine deben devolverlos al lugar donde los encontraron.]**



LANGUAGE DEVELOPMENT

WHAT DO YOU THINK?

1. How might movement help an animal survive? To make this question more meaningful, ask the youngsters how movement helps *them* stay alive (to get food, warmth, protection, oxygen, etc.). When they finish, tell the youngsters that special features of an organism (such as gills for breathing or a powerful tail for fast swimming) that improve an organism's chances of survival and reproduction are called ***adaptations.***
¿Cómo le ayuda el movimiento de un animal a sobrevivir? ¿Cómo les ayuda el movimiento a *ustedes* para sobrevivir? (Para alimentarse, para protegerse, para calentarse, obtener oxígeno, etc.) Las características especiales que tiene un organismo (como las branquias para respirar o una cola muy fuerte para nadar rápidamente) que le aumentan las probabilidades de supervivencia y reproducción se llaman *adaptaciones*.

2. Which animals moved toward objects and organisms? Which moved away? Why might this be?
¿Qué animales se acercaron a los objetos y organismos que fueron añadidos al recipiente? ¿Cuáles se alejaron? ¿A qué crees que se deba esto?

3. What adaptations would you need to live underwater? (Mechanical devices such as scuba are not allowed.)
¿Qué adaptaciones necesitarías para vivir por debajo del agua? (Aparatos como los de buceo no se valen.)

california mini-corps

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DESCRIBING MOVEMENT

Ask the participants to describe the movement of the animals they have investigated. A game of charades can serve this purpose: Each child imitates the movements of his or her aquatic animal, and the rest of the group tries to figure out the animal's identity. **[Vamos a tratar de describir el tipo de movimiento que tenían los animales que investigamos y a jugar a las adivinanzas ("charadas"). Cada uno imita los movimientos de su animal acuático y el resto del grupo tratará de adivinar de qué animal se trata.]**

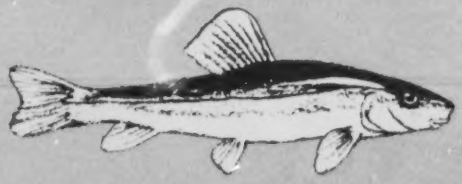
WHILE AT THE POND . . .

Call the youngsters together in a circle, and ask them to describe some of the things they saw while at the pond. (Sit in the circle with the youngsters.) Tell them that their observations can be used to play a game. The game is played like this:

1. You (the leader) say, "Today while at the pond, I saw a polliwog (or any other object or organism you wish to mention). **[Hoy andando por el estanque, vi un renacuajo.]"**

2. The youngster on your left then repeats your lead-in and adds one of his observations. For example: "Today while at the pond, I saw a polliwog and a bunch of cattails. **[Hoy andando por el estanque, vi un renacuajo y un montón de tules.]**"

3. The game continues with each youngster repeating the lead-in, all of the observations previously stated, and then adding his own. **[El juego continúa de la misma manera. Cada uno tiene que repetir todo lo que se ha dicho y además, añadir una de sus observaciones.]**



MINI-DICTIONARY

adaptation or
adaptación: cualquier característica especial de un organismo que le aumenta los probabilidades de sobrevivir y reproducirse.

organism or
organismo: cualquier planta o animal viviente.

A Component of the California Plan for the Education of Migrant Children
E.S.E.A. Title 1, P.L. 93-380

Ants, ants, ants! They show up in our houses and invite themselves to our picnics. We tend to take these invasions personally, but the ants are just trying to make a living.

Ants are almost everywhere. They are colonial insects, living together and cooperating in nearly all aspects of their lives. [Las hormigas son insectos que viven en colonias, conviviendo y cooperando en todas sus funciones.] They communicate directly by touching their antennae [antenas] together, and indirectly by releasing chemicals [substancias quimicas] onto the surfaces on which they walk. These chemical "road signs" allow many kinds of ants to establish the characteristic trails [filas] that we sometimes see.

An active ant is usually looking for food or water. You have probably seen ants carrying pieces of food to their nests. An inadequate supply of food or water, or sometimes too much water, may cause them to enter human homes where they can often find both food and water or escape flooded soil. Ants eat such diverse foods as peanut butter, fruits, and other insects.

Wherever you are right now, some variety of ant is nearby. Why not have some fun and find out about them?

CHALLENGE: FIND OUT HOW ANTS RESPOND TO DIFFERENT SITUATIONS.

RETO: INVESTIGA CÓMO RESPONDEN LAS HORMIGAS A LAS DIFERENTES SITUACIONES QUE SE LES PRESENTAN.

OVERVIEW

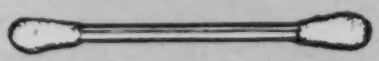
In this activity the youngsters search for ants and discover how they live, what they like to eat, and how they respond to a variety of situations. Action Cards direct the youngsters to observe various aspects of ant behavior. At the end of the activity, the youngsters share all the bits and pieces of information that they have gathered. In this way, the group gets a more complete picture of the life of ants.

MATERIALS

The materials listed include everything necessary for a group of eight. Add extra materials for larger groups.

For each team of two:
1 copy of an Action Card [Tarjeta de Acción]

For the group:
30 cotton swabs



1 sprinkler can or bottle (as used for ironing)
12 small paper cups
12 popsicle sticks
1 data board
1 marking pen

- transparent tape

2 medicine droppers

- assorted possible ant foods (peanut butter, sugar, ice cream, cereal, nuts, flour, crackers, soda pop, popsicles, honey)

3 pieces of cardboard (to wave and create wind)
5 soda straws
1 master each of two sheets of Action Cards

PREPARATION

Time of year. You will find more ants above ground during warm weather.

Site. Find an area that has ants (preferably lots of them) and ant trails. Look along building edges and outdoor walks. You will be most successful with this activity if you work with the common house ants that typically invade kitchens, picnic areas, and other places where food is available. You will not have as much success with the larrger carpenter or red ants.

Foodstuffs. The food stuffs you use may get dirty, so don't bring a full jar of anything. Instead, place an amount equal to about two tablespoons into paper cups or sandwich bags. Bring extra sugar or sweet soda pop.

Action Cards. Duplicate and separate about twenty Action Cards for a group of 12 youngsters.

LAS HORMIGAS
Tarjeta de Acción

Hormigas Muertas

Encuentra una hormiga muerta y usando un palito de paleta helada, aplástala encima de donde pasa la fila de hormigas. ¿Qué es lo que pasa?

Encuentra otro tipo de animal muerto y aplástalo encima de otra parte donde por pasan hormigas. ¿Qué es lo que hacen?

Materiales: un palito de paleta helada, una hormiga muerta u otros animales muertos.

LAS HORMIGAS
Tarjeta de Acción

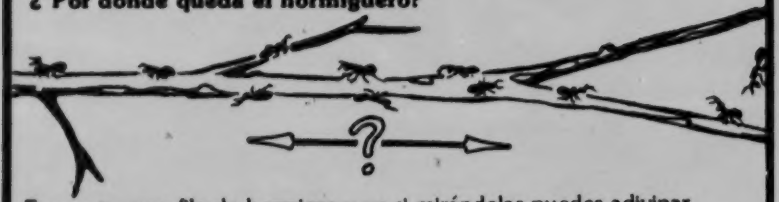
Filas de Hormigas

¿Acaso les gusta a las hormigas tomar atajos (camino cortos)? ¿Por qué crees que las hormigas toman los caminos que toman?

No se necesitan materiales.

LAS HORMIGAS
Tarjeta de Acción

¿ Por dónde queda el hormiguero?

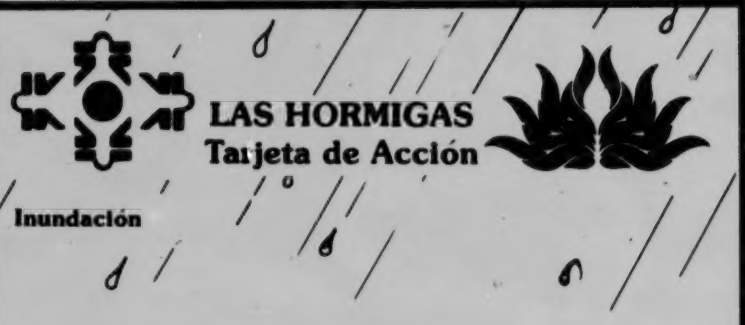


Encuentra una fila de hormigas y ve si mirándolas puedes adivinar en qué dirección queda su hormiguero. Después, sigue la fila hasta encontrar el hormiguero.

No se necesitan materiales.

LAS HORMIGAS
Tarjeta de Acción

Inundación



Despacito, deja caer unas cuantas (1 a 20) gotitas de agua sobre una fila de hormigas para averiguar cómo reaccionan.

Usa un rociador para imitar un aguacero. ¿Qué hacen las hormigas? ¿Cuánto tiempo pasa antes de que todo vuelva a ser normal?

Materiales: agua, un gotero chico, lata o botella rociadora.

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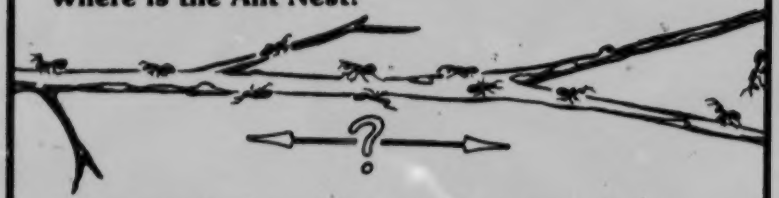
ANTS
Action Card

Where is the Ant Nest?

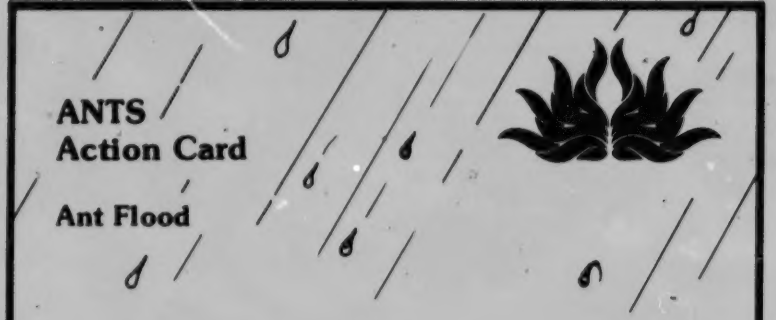


Find an ant trail and see if you can find out from watching the ants which way their home is. Then follow the trail to the ant nest.

No materials needed.

ANTS
Action Card

Ant Flood



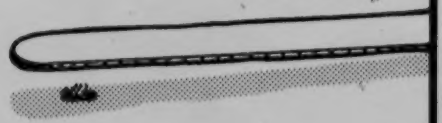
Slowly drop one to twenty drops of water on an active ant trail to find out what the ants do.

Use a sprinkler to fake a rain storm on an ant trail. What do the ants do? How long before life is normal again?

Materials: water, medicine dropper, water sprinkler.

ANTS
Action Card

Dead Ants



Find a dead ant and use a popsicle stick to squash it on the ant trail. What happens?

Find a different kind of tiny dead animal and squash it on a different part of the ant trail. What do the ants do?

Materials: popsicle stick, dead ant, or other animals

ANTS
Action Card

Ant Trails

Do ants take shortcuts? Why do you suppose they take the paths they do?

No materials needed.

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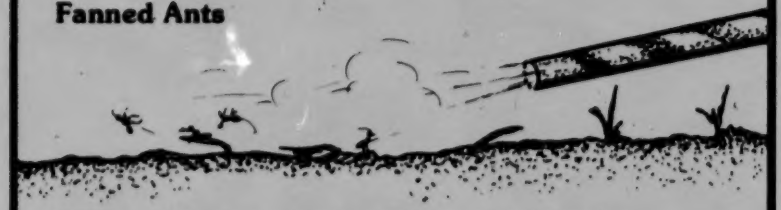
ANTS
Action Card

Fanned Ants

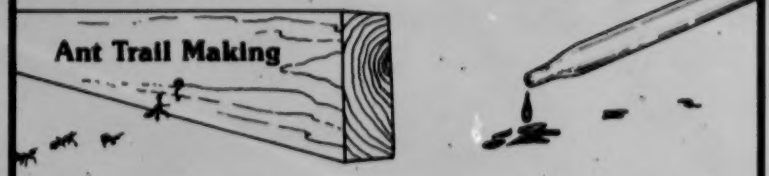


Create a wind on an ant trail to determine what they do.

Materials: piece of cardboard to wave, or soda straw to blow through.

ANTS
Action Card

Ant Trail Making

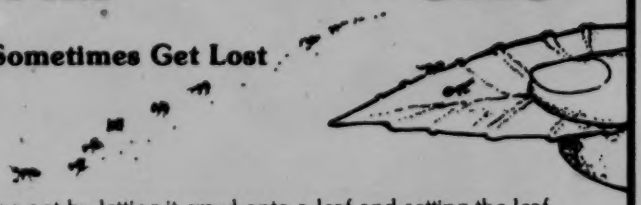


Which is the best way of changing an ant trail?
1. By providing rewards such as laying down a new trail of food?
OR
2. By blocking the old trail with some object? (Rocks, sticks)

Materials: Super food, rocks, soil, sticks, rope, cans.

ANTS
Action Card

Ants Sometimes Get Lost



"Lose" an ant by letting it crawl onto a leaf and setting the leaf down close to, but not right on, the trail. What does the ant do?

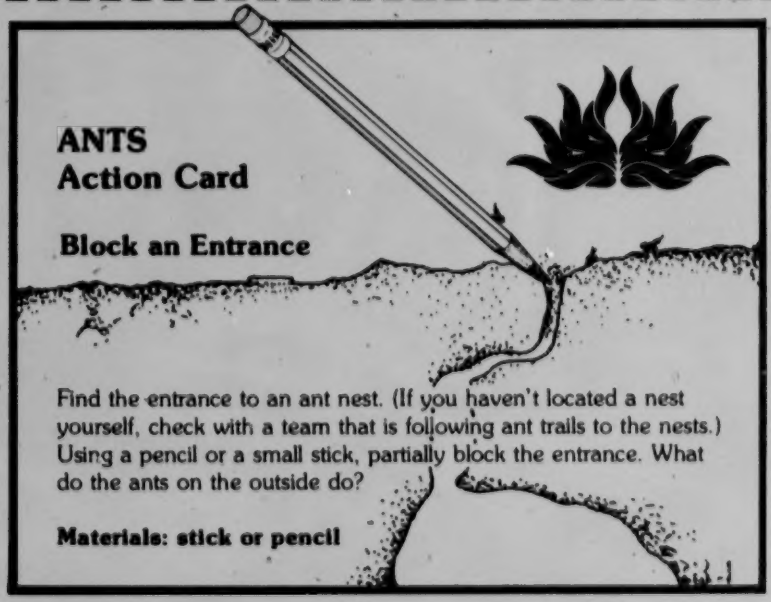
Place an ant from one trail or colony onto another trail or colony.

No materials needed.

33

ANTS
Action Card

Block an Entrance



Find the entrance to an ant nest. (If you haven't located a nest yourself, check with a team that is following ant trails to the nests.) Using a pencil or a small stick, partially block the entrance. What do the ants on the outside do?

Materials: stick or pencil

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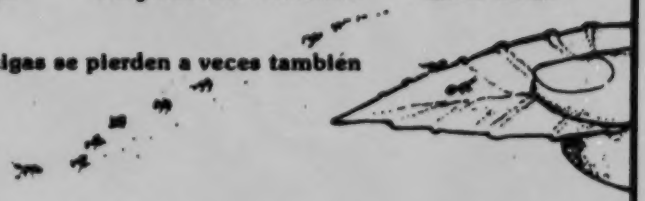
LAS HORMIGAS
Tarjeta de Acción

Las hormigas se pierden a veces también



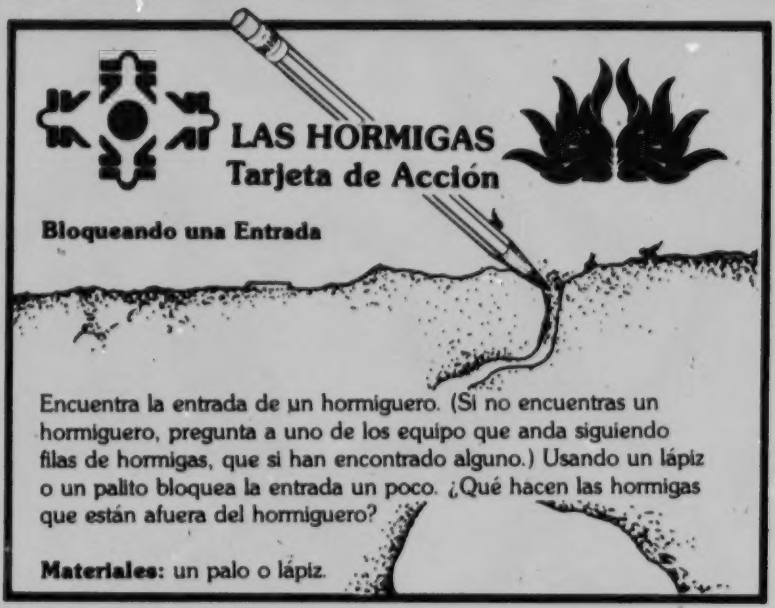
Deja que una hormiga se suba a una hoja para "desorientarla" (que se pierda). Coloca la hoja cerca de (aunque no exactemente en) una fila. ¿Qué es lo que hace la hormiga?

Cambia una hormiga de una fila o colonia a otra diferente.

No se necesitan materiales.

LAS HORMIGAS
Tarjeta de Acción

Bloqueando una Entrada



Encuentra la entrada de un hormiguero. (Si no encuentras un hormiguero, pregunta a uno de los equipo que anda siguiendo filas de hormigas, que si han encontrado alguno.) Usando un lápiz o un palito bloquea la entrada un poco. ¿Qué hacen las hormigas que están afuera del hormiguero?

Materiales: un palo o lápiz.

LAS HORMIGAS
Tarjeta de Acción

Soplando a las Hormigas

Sopla o abanica una fila de hormigas para averiguar qué es lo que hacen.

Materiales: un cartoncillo para abanicar, o un popote para soplar y hacer viento.

LAS HORMIGAS
Tarjeta de Acción

Creando Filas de Hormigas

¿Cuál es la mejor manera de cambiar una fila de hormigas?

1. ¿Atrayéndolas con una hilera de comida?
2. ¿O bloqueando la fila originaria con alguna cosa (piedras o palos)?

Materiales: supercomida, piedras, tierra, palos, cuerda, latas.

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ACTION

1. Take the group to the place where you had seen ants. Point out the ants and say, "These ants seem to be hard at work doing something. Let's see if we can find out what they are doing. **[Estas hormigas se ven como que están muy ocupadas trabajando en algo. Veamos si podemos averiguar qué es lo que están haciendo.]**"

2. Show the group the materials you have brought, and identify all of the items. When you get to the food items, say: "The first thing we should find out is what foods these ants like best. **[La primera cosa que debemos hacer es ver qué tipo de comida les gusta más a estas hormigas.]**"

3. Show the youngsters how to dilute food with water. Put about two pinches of flour and a little water in one of the tiny cups. Stir the mixture with a cotton swab, and dab some near a trail of ants. Say to the group, "I think this is what ants really like to eat. Watch the ants to see what they do. **[Creo que ésto es lo que más les gusta a las hormigas. Hay que observarlas cuidadosamente para ver qué es lo que hacen.]**" Tell the kids that a ***response*** is how an animal acts, or what it does, when faced with a change in situation. **[*Respuesta* significa, en este caso, la manera en que el animal actúa o sea qué es lo que hace cuando se le presenta un cambio de situación.]** The ants may respond by avoiding the food, ignoring the food, or moving to the food.

4. Challenge the youngsters to discover ant *super food*, i.e. the food that they seem to like best. Say, "This flour might be super food, or there might be something else here that the ants like more. **[Esta harina podría ser *supercomida*, pero también podría haber otra cosa que a las hormigas les guste más.]**" Have the kids choose a partner to work with. Help them select equipment, and send them out to discover super food. Note: Emphasize the use of small quantities of food. (An excellent super food is a thin syrup made by dissolving sugar in water. Keep this information from the kids unless they aren't having any luck with their ideas.)

5. Call the group together after ten or fifteen minutes to share their super-food findings. After the kids have discovered a super food for the ants in your area, suggest some other experiments with ants. Tell the group that you have some Action Cards [Tarjetas de Acción] to help them with their investigations. Read one card to the youngsters, and explain to them the types of situations they will be investigating. Give each pair of youngsters a copy of an Action Card. Help them with equipment and send them off to "find out how ants respond to the various situations on the Action Cards **[averiguen cómo responden las hormigas a las diferentes situaciones que se describen en las Tarjetas de Acción]**."

6. As the kids work on their experiments, watch to see how they are doing, and encourage them to show or tell you what they have discovered. If a team completes an investigation quickly, offer another Action Card. Encourage the teams to try some of their own ideas.

LANGUAGE DEVELOPMENT

SPEAKING OF ANTS

Ask the youngsters to share what they have discovered about ants. Let each of the teams read their Action Cards aloud and explain how they met their challenges and how the ants responded to the situations.

ANT FOR A DAY [HORMIGA POR UN DÍA]: A LANGUAGE ACTIVITY

1. Put this list of "Events and Encounters [Acontecimientos y Encuentros]" on a data board:

a. **De pronto empieza un aguacero.** (You get caught in a rain storm.)
b. **Te encuentras un chapulín muerto.** (You find a dead grasshopper.)
c. **Una piedra obstruye la entrada a tu hormiguero.** (A rock blocks the entrance to your nest.)
d. **Te encuentras algo de supercomida.** (You find super food.)
e. **Un ventarrón empieza.** (A wind storm comes up.)

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f. **Te encuentras una hormiga muerta.** (You find a dead ant.

g. **Una rama se cae encima de tu camino.** (A branch falls across your trail.)

h. **Te sales de la fila y te pierdes.** (You get off the trail and get lost.)

i. **Empieza a hacer frío.** (The weather turns cold.)

j. **Pruebas una cosa que sabe horrible.** (You find some nasty tasting stuff.)

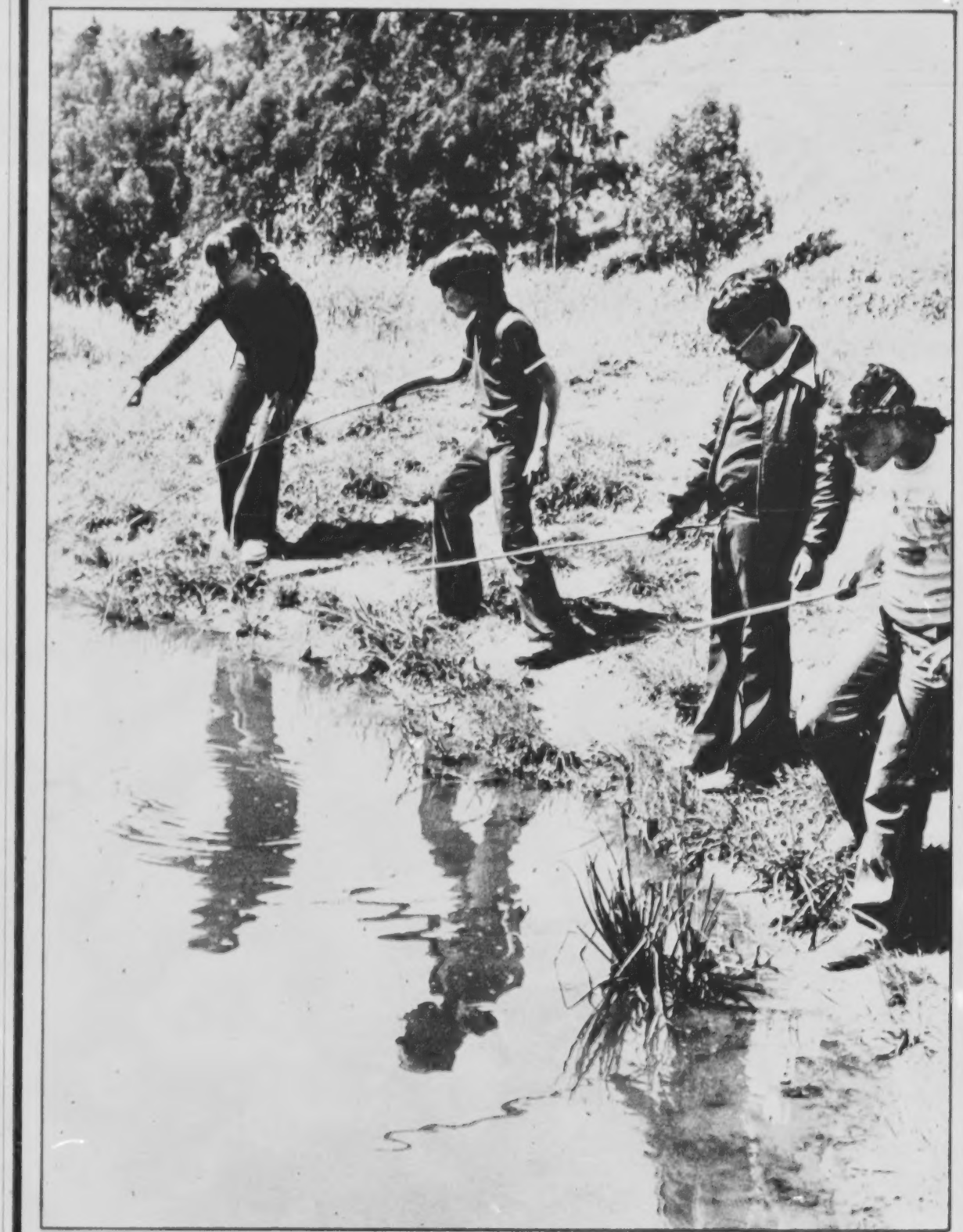
2. Tell the youngsters that they are going to make up a progressive story called "Ant For a Day." **[Vamos a hacer un cuento llamado "Hormiga por un día".]**

3. Have them sit in a circle, and ask them to imagine that they are ants in a trail. **[Imagínense que son hormigas en una fila.]**

4. Start the story yourself. Say, "I am an ant. When I meet another ant, we touch feelers to greet each other. **[Como una hormiga que soy, cuando me encuentro con otra nos tocamos las antenas y de esta manera nos saludamos.]**" Turn to a youngster, tell him to make up the next part of the story using one of the events on the data board as a guide. For example, "When I find super food, I eat some, then tell the other ants where it is. **[Cuando me encuentro supercomida, me la como y luego voy a informar a las otras hormigas a donde se encuentra.]**" Then the next youngster picks an event and adds to the story. Encourage the kids to make up their own events too. Give everyone a chance to add to the story.

MINI-DICTIONARY

organism response or ***respuesta de un organismo:*** lo que un organismo hace cuando se confronta con un cambio de situación.



Have you ever sat quietly by a pond, brook or irrigation ditch and watched minnows [pececillos] milling around in little schools? Curious little devils, aren't they? Perhaps you stood up for a better look only to see the minnows scoot out of sight into the tules or weeds. But then you tossed in a tiny pebble or bit of twig and they rushed in for a closer look.

What attracts fish? What scares them away? What does not affect them one way or the other? [**¿Qué es lo que atrae a los peces? ¿Qué es lo que los espanta? ¿Acaso hay algo que no les afecte en lo absoluto?**] By taking part in *Attract a Fish*, your group investigates these questions.

OVERVIEW

In this activity, the youngsters will have a chance to use "fishing poles" and ***lures*** ["cañas de pescar" y ***cebos*** o ***señuelos***] to investigate fish and what attracts fish.

CHALLENGE: USING SIMPLE EQUIPMENT AND YOUR IMAGINATION, DISCOVER WHAT ATTRACTS MINNOWS.

RETO: USANDO MATERIALES SENCILLOS Y TU IMAGINACIÓN, DESCUBRE QUÉ ES LO QUE ATRAE A LOS PECECILLOS.

MATERIALS

For each youngster:

1 stick (1 meter or more in length)
1 meter-length piece of thin wire (See "Preparation" section.)
1 regular piece of paper
1 pencil or crayon

For the group:

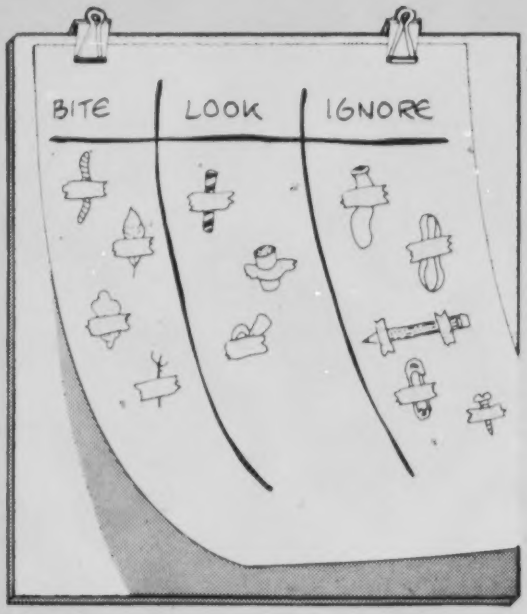
1 data board and two sheets of paper (See the *OBIS Toolbox* folio.)
1 marking pen
2 rolls of transparent tape
- junk box containing: small bits of string, cotton, paper, rubber bands, aluminum foil, colored paper, wire, cork, meat, vegetables, shiny stuff, colorful stuff, etc. [caja de baratijas que contiene: pedacitos de hilo, de algodón, de papel, ligas de goma elástica, hojas de papel aluminio, papel de colores, alambre, corcho, carne, legumbres, cosas brillosas, cosas coloridas, etc.]

PREPARATION

Site. Select a pond, brook, or irrigation ditch that contains minnows.

Fishing Pole. Each youngster can prepare his own fishing pole from a piece of stick, cane, or long twig, by attaching a short length of thin wire to one end. You can obtain suitable wire by taking apart a one-meter length of multi-strand household electric cord. Rip the wire bundles out of the rubber insulation and carefully separate the strands. If you don't feel like ripping apart electric cords, you can purchase #32 copper wire from a hardware store. Wire is easy for kids to use; they can quickly twist lures on and off.

Score Sheet. To keep track of what does and what does not attract fish, prepare a score sheet for your data board.



Buddy System. Review the "Safety" section in the *Leader's Survival Kit* folio for information on buddy teams.

ACTION

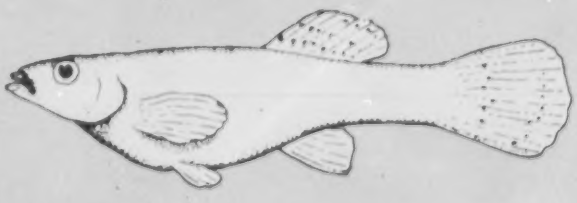
1. Upon arrival at your "fishin' hole," define the limits [límites] of the study area and divide your group into buddy teams [equipos de "compañeros"]. Introduce the activity by pointing out the minnows [pececillos] and challenging the youngsters to attract the minnows to the surface.

2. Hold up a "fishing pole" and suggest to the group that such a rig may be used to find out what attracts fish. **[Con esta "caña de pescar" tratarán de averiguar qué es lo que atrae a los peces.]** Bring out the materials and let each youngster make a pole. Circulate and offer assistance if needed.

3. Before the fishing, hold up the data board with score sheet [cuadro anotador]. (See the "Preparation" section.) Tell the kids that after they try a lure (to attract the fish), they should tape that lure in the appropriate reaction column on the score sheet, and then select or make another lure. Encourage them to try several lures. **[Cada vez que prueben un cebo que atrae, deberán pegarlo en la columna apropiada en el cuadro anotador. Después de esto, cambien y usen otro cebo o señuelo; prueben varios.]**

4. Let the fishing begin! Note: Kids tend to use large lures. You may have to hint at the use of tiny lures (less than ½ cm in any dimension) by encouraging unsuccessful anglers to compare their lures to those made by successful anglers.

5. **Making discoveries.** While the youngsters experiment, circulate and ask questions such as: "If you used the same size lure, but red instead of black, would fish respond? Does a lure with odor work better than one without? Will fish come to a lure when it is jiggled? **[Si usas un cebo de un mismo tamaño que otro, pero rojo en lugar de negro, ¿Cómo crees que los peces reaccionarán? ¿Acaso un cebo oloroso trabaja mejor que uno sin olor? ¿Puedes atraer a un pez cuando zangoloteas el señuelo?]**" Encourage a variety of experimental efforts.



6. **Fishing for answers [Pescando respuestas].** After the youngsters have experimented with a variety of lures, call everyone over to the score sheet [el cuadro anotador] to view the results. You should have a number of lures in each of the three columns. Try some of the following questions to focus attention on the ***properties of lures* [*propiedades de los cebos*]** that make them either successful or unsuccessful fish attractors.

a. Which lures were the best attractors?
¿Cuáles cebos fueron los más atrayentes?
b. Which lures did not attract any fish?
¿Cuáles cebos no atrajeron ningún pez?
c. How does the size of the lure affect its ability to attract?
¿Qué influencia tiene el tamaño del cebo en la atracción de los peces?
d. How does color affect the fish?
¿Cómo afecta el color a los peces?
e. What effect does the motion of the lure have on the fish?
¿Qué efecto tiene el movimiento del cebo en la atracción de los peces?
f. Do surface lures work better than underwater lures? How do lures on the bottom work?
¿Cuál cebo trabaja mejor? ¿El de la superficie o el que está por debajo del agua? ¿Cómo trabajan los cebos en el fondo?
g. How do fish respond to the taste of your lure?
¿Cómo responden los peces al sabor de tu cebo?

7. **The "Super Lure."** On a clear space on your score sheet, write: "Properties of a Good Lure [Propiedades de un buen cebo o señuelo]." Have the group compare the properties of those attractors in the "bite" column on the score sheet. **[Comparen las propiedades de los cebos en la columna "picaron" del cuadro de anotaciones.]** The combination of these properties should result in a "super lure [super cebo]."

8. Have the kids construct the super lure from the junk box and return to the fish pond for further fishing. Do the youngsters actually have more success with the super lure than they did with their first lures?

9. Explain to the youngsters that they have systematically discovered a lure that stimulates fish to bite. Have them use their super lure to investigate the following questions:
a. Do fish get tired of your super lure and ignore

it? How long does it take?
¿Se llegan a cansar los peces del super cebo y lo ignoran? ¿Cuánto tiempo les toma?

b. How far away can a fish be and still sense your super lure?
¿Qué tan lejos puede estar un pez y todavía percibir el super cebo?

c. Can you bring a super lure behind a fish without it detecting the lure?
¿Podrías poner un super cebo atrás de un pez sin que éste lo detecte?

d. Will two fish fight over your super lure?
¿Acaso se pelean dos peces por tu super cebo?

e. What happens when you skim your super lure rapidly across the surface of the water?
¿Qué sucede cuando rozas tu super cebo por la superficie del agua?

LANGUAGE DEVELOPMENT

FISHING LINES

1. After the youngsters have had sufficient time to investigate the effectiveness of the super lure, encourage them to share their discoveries with each other.

On a data board write: SIGHT, TASTE, SMELL, TOUCH, and HEARING **[VISTA, GUSTO, OLFATO, TACTO y OÍDO]** in a column at the left of the board. Ask the group to use these words in sentences. Explain that these are the five ***senses*** [los cinco ***sentidos***]. Ask the group, "Which of these senses of the fish may have been stimulated or excited by the super lure? **[En el pez, ¿cuál de estos sentidos fue estimulado por el super cebo?]**" (For example, the fish's sense of sight might have been stimulated by changes of color, movement, etc.) List the youngsters' answers next to the corresponding sense on the data board.

Have the group compare the answers and ask the group, "Which senses do you feel are the most important to the fish that your super lure attracted? **[Cuáles son los sentidos más importantes en el pez que atrajiste con tu super cebo?]**"

2. Give everyone a regular piece of paper and pencil. Have each child write SIGHT, TASTE, SMELL, TOUCH, HEARING **[VISTA, GUSTO, OLFATO, TACTO, OÍDO]** on his paper. Ask each of the youngsters to write a sentence about what they like to use each sense for. **[Escribe una oración acerca del modo como te gusta usar tus sentidos.]** For example:

SIGHT: I like to watch soccer games.
TASTE: I like the taste of tacos.
SMELL: I like the smell of mint.
TOUCH: I like to touch fuzzy peaches.
HEARING: I like to hear mariachi music.

VISTA: Me gusta ver los juegos de futbol.
GUSTO: Me gusta comer tacos.
OLFATO: Me gusta el olor de la yerbabuena.
TACTO: Me gusta tocar duraznos velludos.
OÍDO: Me gusta oir música de mariachis.

The youngsters can also illustrate the sentences they write. Staple the papers together to create a group book, *What Turns Me On* [*Lo que más me gusta*]. The book can be placed in the camp's OBIS center [Centro OBIS del Campamento] for the kids to browse through.

MINI-DICTIONARY

lure or
cebo o señuelo: lo que se usa para tentar animales o atraer peces para que piquen (como gusanos, carne, papel colorido o brilloso, etc.).

properties of lures or
propiedades del cebo: las características del cebo como color, forma, tamaño, etc.

sense or
sentido: la habilidad para recibir estímulos a través de los órganos del cuerpo y sus nervios. Los sentidos son vista, oído, tacto, olfato y gusto.

A Component of the California Plan for the Education of Migrant Children
E.S.E.A., Title 1, P.L. 93-380

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Many people enjoy a walk in the woods, along the shore, or in other parts of their ***environment* [*medio ambiente*]**. Awareness of the variety found in nature can enhance a person's aesthetic appreciation of such walks. The color of fall leaves; the fragrance, shape, and color of spring flowers; the textures and patterns of trees, ferns, and mosses are only a few examples of the variety [variedad] people may find in their environment.

OVERVIEW

Envirolopes [*Ambientándonos*] is an activity that introduces youngsters to the skills of basic observation, and the terms ***evidence* [evidencia]** and ***properties* [*propiedades*]**. The youngsters search for objects that have certain properties and find evidence of past events in objects such as feathers and piles of nuts. The activity may be used along a trail, around a lake, at a camp, or on a family outing.

Envirolopes encourages youngsters to observe the variety of colors, forms, textures, and organisms present at any outdoor site, and to share their discoveries with others.

Teams of two receive a challenge such as: "Find at least five different shades of green." The youngsters collect samples small enough to fit in envelopes, and then display and discuss their discoveries.

CHALLENGE: FIND EXAMPLES OF THE VARIETY IN NATURE AS SUGGESTED ON YOUR ENVIROLOPE.

RETO: ENCUENTRA EJEMPLOS DE LA VARIEDAD QUE HAY EN LA NATURALEZA COMO SE INDICA EN EL "SOBRELAMBIENTE".

MATERIALS

For each team of two:

1 envelope with one challenge on it (an Envirolope [un "Sobrelambiente"])

Possible challenges include:

- ☐ Find the ten most unusually shaped leaves.
  Encuentra diez hojas que tengan formas muy inusuales.
- ☐ Find at least five examples of different textures.
  Encuentra cuando menos cinco ejemplos de texturas diferentes.
- ☐ Find at least five objects, each one of a different odor.
  Encuentra cuando menos cinco cosas con olor diferente.
- ☐ Find at least five different kinds of seeds.
  Encuentra al menos cinco tipos diferentes de semilla.
- ☐ Find at least five objects, each one a different color.
  Encuentra cuando menos cinco cosas con color diferente.
- ☐ Find at least five different kinds of evidence that animals are around (such as a leaf with bites taken out of it).
  Encuentra cuando menos cinco tipos diferentes de evidencia que animales han estado en los alrededores (como una hoja que ha sido mordida).
- ☐ Find at least five different kinds of evidence that people are around (trash, for example).
  Encuentra cuando menos cinco tipos diferentes de evidencia que personas han estado por aquí (basura por ejemplo).
- ☐ Find at least five different kinds of rocks.
  Encuentra cuando menos cinco tipos diferentes de piedras.
- ☐ Find at least five objects, each one a different shade of brown.
  Encuentra al menos cinco objetos cafés, cada uno de diferente tono.
- ☐ Find at least five objects, each one a different shade of green.
  Encuentra al menos cinco objetos verdes, cada uno de diferente tono.

For the group:

1 copy of "Envirolope Challenges [Retos de Sobrelambiente]" card
1 data board (See *OBIS Toolbox* folio.)
1 marking pen
• glue or tape (for adhering challenges to envelopes)

Envirolopes

ENVIROLOPE CHALLENGES

Encuentra diez hojas que tengan formas muy inusuales.

Find the ten most unusually shaped leaves.

Encuentra cuando menos cinco ejemplos de texturas diferentes.

Find at least five examples of different textures.

Encuentra cuando menos cinco cosas con olor diferente.

Find at least five objects, each one of a different odor.

Encuentra al menos cinco tipos diferentes de semillas.

Find at least five different kinds of seeds.

Encuentra cuando menos cinco cosas con color diferente.

Find at least five objects, each one of a different color.

Encuentra cuando menos cinco tipos diferentes de evidencia que animales han estado por ahí (como una hoja que ha sido mordida).

Find at least five different kinds of evidence that animals are around (such as a leaf with bites taken out of it).

Encuentra cuando menos cinco tipos diferentes de evidencia que personas han estado por ahí (basura por ejemplo).

Find at least five different kinds of evidence that people are around (trash, for example).

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Encuentra cuando menos cinco tipos diferentes de piedras.

Find at least five different kinds of rocks.

Encuentra al menos cinco objetos cafés, cada uno de diferente tono.

Find at least five objects, each one a different shade of brown.

Encuentra al menos cinco objetos verdes, cada uno de diferente tono.

Find at least five objects, each one a different shade of green.

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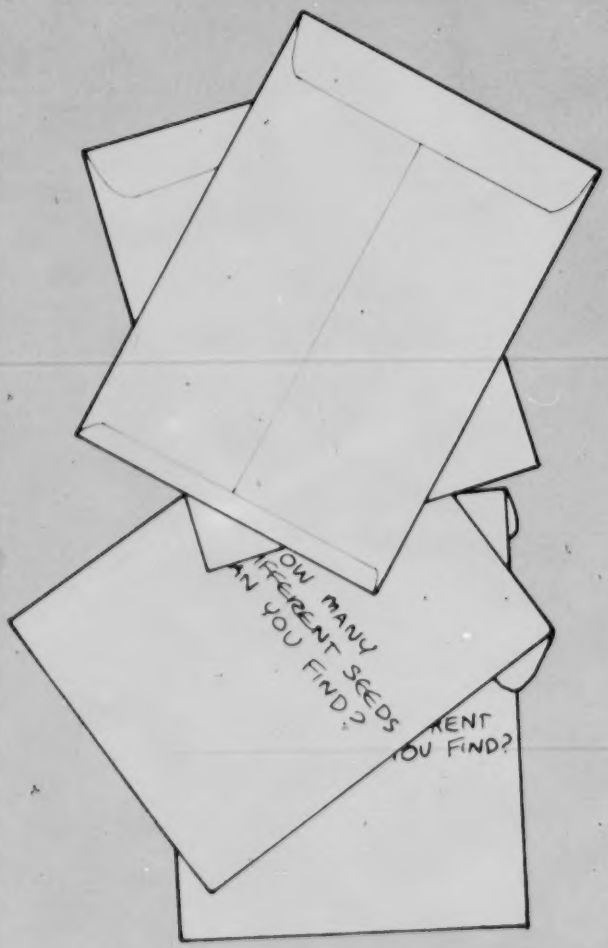
PREPARATION

Site. Select a site where collecting small samples of such things as leaves and twigs etc. is allowed. (Obtain permission if necessary.)

Envirolopes. Make a copy of the "Envirolope Challenges" card. Select the challenges that are appropriate for your site and group. Cut the challenges apart and adhere each one to a different envelope. (These will be called Envirolopes.)



ACTION

1. Take the group to the selected area and point out the boundaries [límites] of the site to them. Show the youngsters an example of an envirolope, and encourage them to discuss how its challenge might be met. Introduce the term ***evidence*** as an indication or sign of something that may have happened at a particular place. **[*Evidencia* es una manifestación de que algo ha pasado en un cierto lugar].** Cite some examples of evidence, such as a feather (indicating that a bird is or was nearby). Also introduce the term ***properties*** as being the characteristics or traits of an object, such as color, shape, texture, size, weight or odor. **[Las *propiedades* son las características o rasgos de un objeto como color, forma, textura, tamaño, peso y olor.]**

2. Explain that each team of two will receive an envirolope with a challenge on it **[un "sobrelambiente" con un reto escrito en éste],** and that they will have about twenty minutes to search for small samples [muestras pequeñas]. To prevent the kids from bringing back trees, make a rule that each sample must fit in the envirolope.

3. Divide the group into teams of two. Save one envirolope for yourself so that you can participate, and distribute the others to the group. Send them off to hunt [a buscar]. Circulate among the teams as they search, inviting them to describe or tell you about some of their more interesting discoveries. Listen to any unusual reports, and offer assistance when necessary.

4. Call everyone back after twenty minutes, and ask each of the teams to display their collections **[exhiban sus colecciones].**

5. Invite each team to report on one or more of their collections that appear particularly interesting and ask: "What are some of the properties of the objects you found? **[¿Qué propiedades tienen los objetos que encontraste?]"** Ask the other teams to check their own collections for items that could be added to the one being shared. Continue this for as long as the participants find it interesting.

6. **Hunt again (optional).** Invite the kids to think up new challenges such as: "Search for an object that has six different properties. **[Busca un objeto que tenga seis propiedades diferentes.]"** Send them off to repeat the activity.

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LANGUAGE DEVELOPMENT

DISCUSSION TOPICS

Encourage the children to share their observations and ideas about how the objects they found happened to be there. Allow comments such as "My seed is fuzzier and greener than yours" to evolve into discussions that involve several different kids. Ask them:

1. What objects are part of more than one collection?
¿Qué objectos forman parte de más de una colección?

2. What types of evidence do animals leave? What types of evidence do people leave?
¿Qué tipo de evidencia dejan los animales? ¿Qué tipo de evidencia dejan las personas?

3. Did you find more evidence of animals or of people? Why do you think you found more of that type of evidence?
¿Acaso encontraste más evidencia de animales que de gente? ¿Cuál piensas que es la razón de haber encontrado más evidencia de ese tipo?

4. Why do you suppose some collections contained more items than others?
¿Por qué crees que algunas colecciones contenían más objetos que otras?

5. Which envirolope provided the most difficult challenge?
¿Qué "sobre[illegible]biente" tenía el reto más difícil?

THE PROPERTIES GAME

Reviewing the term *property* [*propiedad*]. Ask a youngster to show you a green object [un objeto verde] he collected. Tell the group that green coloration is a ***property***. Now ask for a smooth object [un objeto suave], and tell the kids that smoothness is also a property. Some objects have many different properties.

The Game. Let one youngster hold up his favorite "find." The first person to name at least three different properties of that one object gets to show his favorite object next.

Jugando. Levanta el objeto más bonito de los que encontraste. La primera persona que nombre al menos tres propiedades diferentes de este objeto será el siguiente que enseñe su objeto favorito.

MINI-DICTIONARY

environment or
medio ambiente: todo lo que nos rodea como plantas, animales, objetos materiales y condiciones climatológicas.

evidence or
evidencia: una manifestación o indicación de que algo ha sucedido.

properties or
propiedades: las características o rasgos de un objeto como color, textura, tamaño, forma, peso y olor.

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Feeding relationships are often difficult to observe. In this activity, the youngsters gain some understanding of these relationships by assuming the roles of animals and simulating feeding relationships.

Popcorn is spread over a lawn area. The kernels of popcorn represent plants, which are food sources for plant eaters. Some youngsters play grasshoppers (plant eaters), some play frogs (which eat grasshoppers), and some play hawks (which eat frogs). The object of the game is for each animal to get something to eat without being captured and eaten before a five-minute "day" ends.

In nature, the ***populations*** **[*poblaciones*]** of plants and animals are usually large enough to insure continuation of a species if some are lost. In this game, populations (popcorn plants, hoppers, frogs, hawks) are so small that the survival of even one of each kind indicates a "balanced," ongoing ***community*** **[*comunidad*]**.

You can repeat this game many times during one activity session. With each repeat, encourage the youngsters to change the rules of behavior and the numbers of each kind of animal until a "balance" is achieved in your corn→hopper→frog→hawk ***food chain*** **[*cadena alimenticia*** de maiz→chapulin→rana→halcon]

Throughout this activity, encourage the youngsters to verbalize their own experiences as much as possible.

OVERVIEW

The children play and modify a game to find out how many of four different kinds of ***organisms*** **[*organismos*]** are necessary to achieve a "balance" in a simulated food chain.

CHALLENGE: STAY ALIVE BY COLLECTING FOOD AND NOT GETTING CAUGHT.

RETO: SOBREVIVE POR UN DÍA COMPLETO COMIENDO A OTROS ORGANISMOS SIN QUE OTRO ANIMAL TE ATRAPE.

MATERIALS

For each "animal":

1 sash (See the "Preparation" section for size and numbers.)
1 plastic bag "stomach" (sandwich bag)

For the group:

4 to 5 liters of popped corn (or beans, seeds etc.)
1 data board
1 marking pen
1 kitchen timer with bell (or just a watch and a verbal signal)
1 roll of one-inch (2.54 cm) masking tape
1 "Food Chain" card

PREPARATION

You need at least ten youngsters for this activity, but twenty makes the activity more fun.

Sashes. Make the sashes from strips of cloth in three different colors. The sashes should be about 1 meter long and 10 to 20 cm wide. Make 8 sashes of one color (probably for the hawks), 15 of another color, and 20 of a third color. This combination of sashes allows the group to vary the population numbers.

Stomachs. Prepare "stomach" bags. Place a one-inch (2.54 cm) strip of masking tape across the sandwich bag so that the bottom edge of the tape is 4 cm from the bottom of the bag. (See #2, "Analysis," in the "Playing the Games" section.)

Site Selection. A section of lawn or other open, flat area that is 15 to 20 meters on a side is sufficient. The group may decide to designate potential safety zones such as trees, a walk, etc., where hoppers and frogs can hide, or be "safe [a salvo]".

ACTION

INTRODUCING FOOD CHAINS

1. Hold up the Food Chain card and ask the youngsters to name the plants and animals shown on it. You should provide them the names (hawk, frog, grasshopper, and leaf [halcón, rana, chapulín, y hoja]) if the children are not familiar with them.

2. Tell the children that each of the animals mentioned eats one of the organisms (plants or animals) shown on the card. **[Cada uno de los organismos en la cadena se alimenta de otro (planta o animal).]** You may wish to use organisms other than those on the card, such as corn→mouse→snake→hawk or algae→mayfly→frog→bass [maíz→ratón→víbora→halcón o alga→efímera o mosca de mayo→rana→perca]. Offer the children an opportunity to name or guess the feeding relationships. Don't expect them to know these relationships because they may not have had any experience with the organisms.

3. Point out the arrows that go from the organism that is eaten to the one doing the eating. Explain that this relationship is called a ***food chain*** because each plant or animal is like one link in a chain. All the organisms are connected because each succeeding organism depends on the availability of the previous organisms for food. **[Esta relación es llamada *cadena alimenticia* ya que cada planta y cada animal es como el eslabón de una cadena. En ella, todos los organismos están conectados debido a que dependen uno del otro para su alimentación.]**

Food Chain Game
FOOD CHAIN

La Cadena Alimenticia
CADENA ALIMENTICIA

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ORGANIZING THE GAME

1. Point out the limits [límites] of the gaming area. Spread popcorn over the area. (Save a little for later.) Tell the group that you are distributing plants that grasshoppers eat. **[Estas son las plantas de las que los chapulines se alimentan.]**

2. Make one-third of your youngsters grasshoppers and give each one a plastic bag and a sash. (All of these sashes should be the same color.) Tell the grasshoppers to put their food (popcorn) in their "stomachs" (bags) when the game starts. **[Chapulines: en cuanto empiece el juego recojan su "alimento" y pónganlo en sus "bolsas estomacales" (las bolsas de plástico).]**

3. Hand out bags and frog sashes to a second one-third of the group, and hawk bags and sashes to the remaining one-third. Explain to the youngsters that during each round of the game, frogs will try to capture (tag) hoppers, and hawks will pursue frogs. After a frog captures a hopper, the hopper's stomach contents are transferred to the stomach of the frog. After a hawk captures a frog, he takes the frog's whole stomach. When an animal is captured, he is out of that game. *Hawks do not eat hoppers in this game.* **[Cuando el juego comience, las ranas tratarán de capturar a los chapulines, y los halcones a su vez perseguirán a las ranas. Cuando una rana capture a un chapulín, lo que éste tenía en su bolsa estomacal, pasa al estómago de la rana. Cuando un halcón capture a una rana se debe quedar con la bolsa estomacal de ésta. Una vez que un animal es capturado queda fuera del juego. *Los halcones no comen chapulines en este juego.*]**

PLAYING THE GAME

1. State the CHALLENGE. Set the timer for five minutes and yell "GO **[EMPIECEN]**!" The first game usually lasts only a few seconds with one of two things happening: (1) Hoppers are eaten before they have a chance to get food; or (2) The frogs are captured, and hoppers continue to eat popcorn and get fat.

2. If at least one of each kind of animal survives, you have balanced populations in this food chain. How many animals survived? **[¿Cuántos animales sobrevivieron?]** For a hopper to survive, popcorn must fill his stomach to the bottom of the tape (4 cm). For a frog to survive, popcorn must fill the stomach to the top of the tape (6½ cm). Hawks must have the equivalent of one frog with a full stomach.

3. **Speaking as a grasshopper.** At this point, encourage each youngster to describe what it was like to be a grasshopper or a frog or a hawk. Which had to work harder? Which was in more danger? Which was in less danger? Ask the youngsters to explain how they got caught. Who caught them? **[Describan lo que se sentía ser chapulines, ranas o halcones. ¿A cuáles les era más difícil conseguir comida? ¿Cuáles tenían más peligros? ¿Cuáles tenían menos peligros? ¿Cómo fueron atrapados y por quién?]**

4. **Making New Rules.** Ask the youngsters how they could change the game so that more animals would survive. **[¿Cómo podrían cambiar el juego para que más animales sobrevivan?]** Give the kids time to think and to make suggestions. Typical ideas are:

a. Change some hawks into frogs or into hoppers. **[Algunos halcones cámbiense a ranas o chapulines.]**
b. Change frogs to hoppers. **[Algunas ranas cámbiense a chapulines.]**
c. Provide more plants (popcorn). **[Vamos a esparcir más "plantas" (palomitas de maíz).]**
d. Allow hoppers and frogs to have safety zones. **[Las ranas y los chapulines podrán tener zonas donde puedan estar "a salvo".]**

LANGUAGE DEVELOPMENT

VARIATIONS . . .

1. Review the number distribution of organisms that finally produced a "balanced" community. **[¿Cuántos animales de cada clase produjeron una comunidad balanceada?]** Encourage the children to build a human pyramid with the appropriate number of grasshoppers on the bottom, frogs in the middle, and hawks on top. **[Formen una pirámide humana con la cantidad apropiada de chapulines en la parte baja, las ranas en medio y los halcones en el tope.]** Give the kids the idea but let them organize it.

2. Ask the youngsters what animals they eat and

what those animals eat.

3. Tell a story about a lonely hawk that can't find any plants. Ask: "Do hawks eat plants?" (No.) "Does a hawk have to have plants?" (Yes, because the animals the hawk eats use plants for food.) **[Este era un halcón solitario que no podía encontrar plantas. ¿Acaso el halcón necesitaba plantas para su alimentación?" (No.) "¿Y las necesitaba en la región donde vivía?" (Sí, ya que los animales que el halcón le gusta comer, se alimentan de plantas.)]**

4. Encourage the children to make a poster of any food chain on a piece of butcher paper. In addition to the drawings, encourage them to write in the names of the plants and animals. They may even wish to display a poster in the camp's OBIS Activities Center [Centro OBIS del campamento].

ADDING ANIMALS GAME [JUEGO DE "SUMAR" ANIMALES]

Print the name of any animal on the upper left corner of the data board on a large piece of paper. Name one food that the animal eats (e.g. RAT: wheat [RATÓN: trigo]).

Invite a youngster to give another animal's name that begins with an R an A or T (e.g. ANT). If the student can name a food that ants eat she can add her animal to RAT. **[Nombra un animal que empiece con cualquiera de las letras en la palabra RATÓN (p.ej. OSO). Si puedes decir con lo que el oso se alimenta, podrás escribirlo en el cartelón.]** For example:

RAT	RATON
N	S
T	O

Continue with this scheme until every child has had at least one opportunity to add an animal.
Note: Although the end result of this language game will appear to be a chain of animals, the chain is *not* a food chain.

MINI-DICTIONARY

food chain or
cadena alimenticia: la transferencia de energía en forma de alimento desde la fuente donde se origina (o sea las plantas), a través de una serie de organismos que comen o son comidos (P.ej.trigo→grillo→rana→mapache.)

organism or
organismo: cualquier planta o animal viviente.

population or
población: un conjunto de organismos de la misma especie que viven y se reproducen en una misma región.

community or
comunidad: los grupos de plantas y animales que viven en la misma región.

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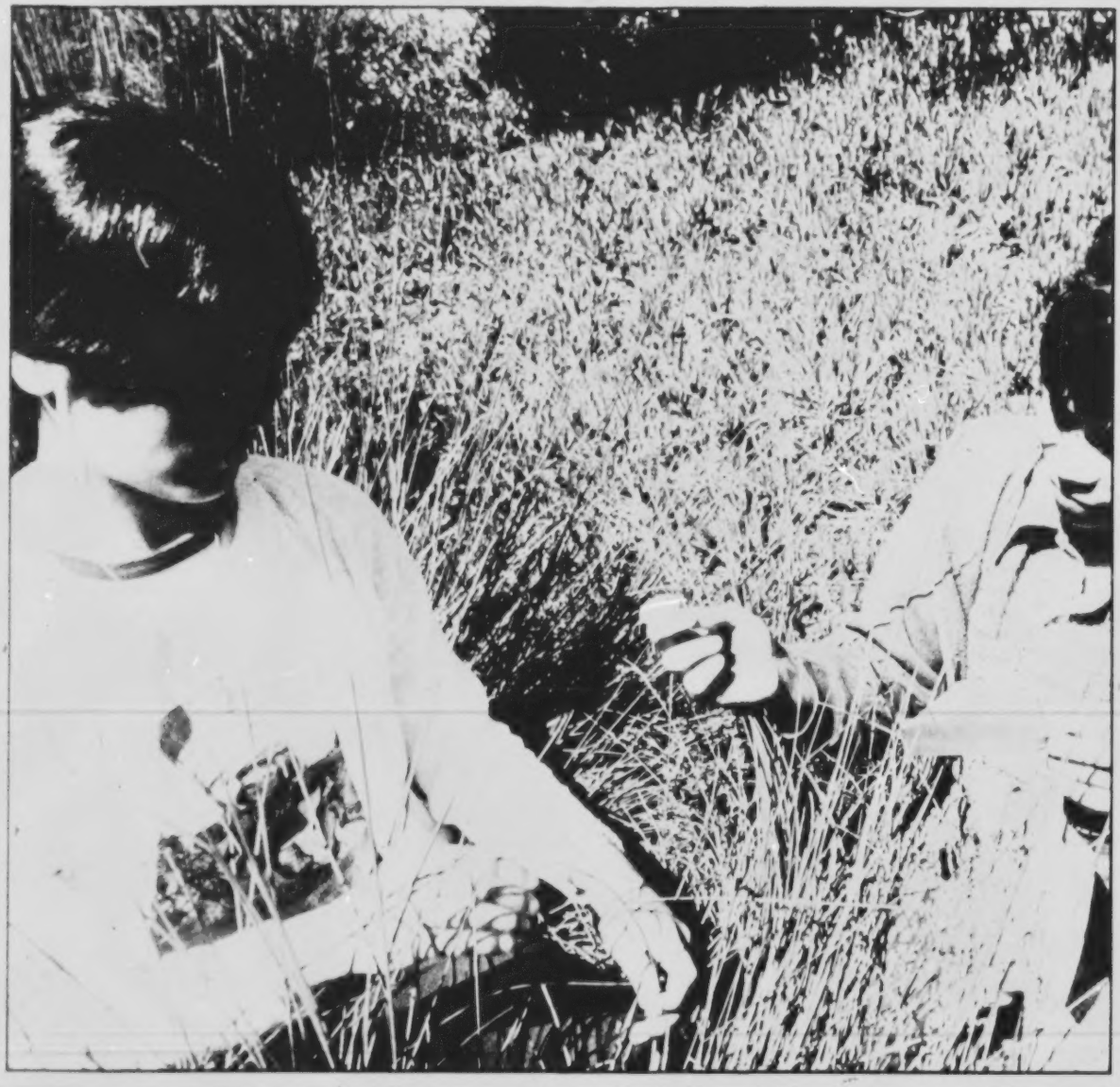
A Component of the California Plan for the Education of Migrant Children
E.S.E.A., Title I, P.L. 93-380



Outdoor games, besides being fun, are effective tools for introducing youngsters to an outdoor area, and also for building their observational skills. Outdoor games can be even more fun and of greater value if the youngsters take part in creating the game.

OVERVIEW

The game in this activity is a version of the popular scavenger hunt. Youngsters receive sets of Hunt Cards [Fichas de Exploración] that challenge them to make observations and discoveries in their immediate ***environment* [*medio ambiente*].** After going on the scavenger hunt, the youngsters share their discoveries with the group.

Following the initial game, the youngsters have the opportunity to create Hunt Cards for a new game or for another group of youngsters.

CHALLENGE: HUNT FOR INTERESTING AND UNUSUAL THINGS IN YOUR ENVIRONMENT.

RETO: BUSCA COSAS INTERSANTES E INUSUALES EN EL MEDIO AMBIENTE.

MATERIALS

For each team of two:
1 small paper or plastic bag

For the group:
1 pack of index cards (3" x 5") [tarjetas de ficha]
1 pair of scissors
1 box of crayons
1 pen, preferably with waterproof ink
- yarn
- masking tape

PREPARATION

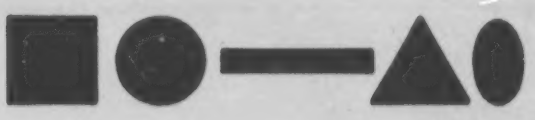
Make enough sets of Hunt Cards [juegos de Fichas de Exploración] for each team of two to have a set (five to eight cards). You can use these sets over and over again with different groups of youngsters.

1. Decide what type of challenges [retos] you want in the sets of Hunt Cards. Your challenges can be general or have a specific theme. In any case, each team should have a different set of challenges. For example:

a. **General [Retos Generales]:**
Encuentra una semilla que sea arrastrada por el viento. (Find a seed that travels by wind.)
Encuentra tierra que se sienta como arcilla o barro. (Find soil that feels like clay.)
Encuentra un lugar en donde viva un animal. (Find an animal home.)
Encuentra un insecto en una planta. (Find an insect on a plant.)

b. **Theme: Animal food [Alimento para animales]**
Encuentra alimento para un pájaro. (Find food for a bird.)
Encuentra alimento para una ardilla. (Find food for a squirrel.)
Encuentra alimento para un insecto. (Find food for an insect.)

c. **Theme: Shape Challenges [Retos de formas]**
Encuentra objetos en la naturaleza que tengan estas formas (find natural objects that have these shapes):



2. Write the challenges on index cards, one challenge to a card.

3. Punch a hole in the cards and string five to eight Hunt Cards on a piece of yarn to make a set. That's it!

ACTION

1. Tell the group, "Today we are going to go hunting. We are going to hunt with our eyes and make some discoveries about our environment. **[Hoy vamos a explorar. Vamos a buscar con la vista y hacer algunos descubrimientos acerca de nuestro medio ambiente.]**" Tell the kids that the ***environment*** is everything that surrounds them: plants, animals, non-living objects, and conditions. **[*Medio ambiente* es todo lo que nos rodea: plantas, animales, objectos físicos y condiciones climatológicas.]**

2. Divide the group into teams of two youngsters [equipos por parejas]. Define the limits [límites] of the hunting area, and hand out one set of Hunt Cards [Fichas de Exploración] and a bag to each team. Say to the youngsters: "Read the Hunt Cards and hunt for a small sample of what is

described. Put the sample into your bag to share later. **[Lean sus Fichas de Exploración y busquen muestras pequeñas de lo que se les pide. Guarden en la bolsa lo que encuentren para mostrar después.]**" Let the hunt begin. (Allow fifteen to twenty minutes.)

3. Circulate among the youngsters while they hunt, offering help when they can't figure out a challenge. When they have completed their search, call the youngsters to a place that is convenient for sharing the discoveries [descubrimientos].

LANGUAGE DEVELOPMENT

HUNTING FOR ANSWERS

1. Ask each of the youngsters to read one of their Hunt Cards and show the samples they collected in response to their challenges. Encourage the youngsters to describe what they found and why they think it meets the challenge. **[Lee una de tus Fichas de Exploración y enseña la muestra que recolectaste. Descríbenos cómo es la muestra y por qué cumple con el reto.]**

2. Ask the group:

a. What was the most interesting object that you found in the environment?
¿Cuál fue el objeto más interesante que se encontraron en el medio ambiente?

b. Which Hunt Cards presented the most difficult challenges? Were there some challenges for which you could find no objects?
¿Cuáles Fichas de Exploración tenían los retos más difíciles de cumplir? ¿Acaso hubo algún reto tan difícil que no pudiste encontrar ningún objeto de los que se pedían?

c. What man-made objects did you see while you were searching? Which challenge could have been met with these man-made objects?
¿Vieron algún objeto artificial mientras estaban explorando? ¿A qué Ficha de Exploración se le podría aplicar este objeto?

PLAY IT AGAIN, SAM: A LANGUAGE ACTIVITY

Ask the kids, "Want to go hunting again? **[¿Quieren explorar de nuevo?]**" Tell the kids to write their own Hunt Cards, exchange them, and go hunting again. Perhaps the group would even enjoy creating Hunt Cards for another group of youngsters to use in exploring their environment.

MAGIC NAMES [NOMBRES MÁGICOS]: A LANGUAGE GAME

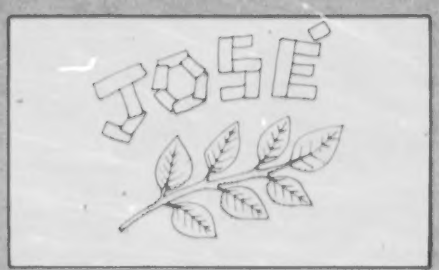
Use some of your samples (leaves, for example) to make a name tag or piece of note paper. Here's how:

1. Cut some masking tape into thin strips. Let the kids use these strips to make letters that spell their names or other words on an index card. **Corten un pedazo de cinta adhesiva opaca en tiras (angostas). Con éstas pueden formar letras para escribir su nombre (u otra palabra) en una tarjeta de ficha.**

2. Place a leaf on the card. **Coloquen unas hojas de árbol en las tarjetas.**

3. Cover the leaf-letter set up with a piece of paper, and scribble on the paper with a crayon. The image of words and leaf will emerge. **Cubran todo con un pedazo de papel y rayen encima con un creyón. La imagen del nombre y de la hoja aparecerán.**

4. Use your creation for a piece of notepaper, or cut the image out to make a name tag. **Usen sus trabajos manuales como papel de notas personalizado, o córtenlos para hacer una tarjeta con su nombre.**



MINI-DICTIONARY

environment or
medio ambiente: todo lo que nos rodea como plantas, animales, objetos materiales y condiciones climatológicas.

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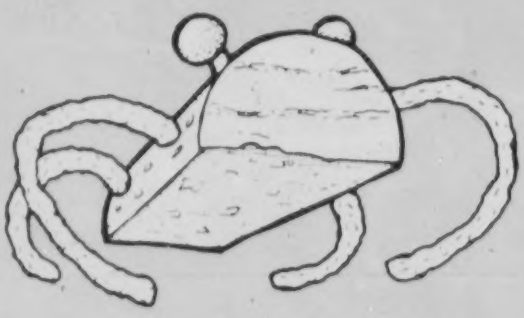
Organisms living in streams, rivers, creeks, and marine sites that have wave action must withstand swiftly flowing water or be carried away by it. Different organisms have different structures or behaviors that enable them to resist aquatic currents [corrientes de agua]. Some organisms have streamlined shapes, some have holding structures, others burrow down into the streambed or search out protected spots. Examples:

Stonefly nymphs are flat and have hooks on their legs for holding onto stones and plants.
Las ninfas de las moscas de piedra son planas y tienen ganchos en sus patas para detenerse de las piedras y las plantas.
Clams burrow into mud or sand.
Las almejas se entierran en el lodo o arena.
Fish often stop in eddies or seek shelter among rocks.
Los peces de no de vez en cuando paran en las partes estancadas o buscan refugio entre las rocas.
Plants use modified roots or specialized holdfasts to hold onto rocks or streambeds.
Las plantas se bastan de sus raices modificadas o agarraduras especiales para sujetarse de las rocas o lechos de los rios.

Specialized shapes, holding devices, and protection-seeking behavior are examples of adaptations for living in running water. An ***adaptation*** **[*adaptacion*]** is any feature of an organism that improves its chances of survival and reproduction.

OVERVIEW

In this activity, the youngsters construct and test models of organisms designed to withstand the force of running water (Part I). In Part II, the youngsters investigate the holding structures and behavior of real organisms living in the running water.



MATERIALS

PART I

For each buddy team:

1 "organism body": cork or sponge (See the "Preparation" section.)
1 half-gallon milk carton

For the group:

1 junk box containing: waterproof tape (electrical, duct, etc.), clay, bobby pins, paper clips, rubber bands, toothpicks, pipe cleaners, heavy thread or string, extra cork or sponge bodies
2 to 4 pairs of scissors

PART II

For each buddy team:

1 container (milk cartons from Part I)
1 bug box*
1 dip net (aquarium size)*
1 plastic cup*
1 "Hold-It Trough" Equipment Card [Tarjeta de Equipo del "Canal de Agua"]+
1 "Aquatic Observation Aids" Equipment Card ["Equipo de ayuda en la observación de la vida acuática"]

Optional:

Pond Guides (for freshwater sites)*

+ See *OBIS Toolbox* folio.

*Available from the Lawrence Hall of Science. (See the "Equipment Order Form" in the *OBIS Toolbox* folio.)

PREPARATION

Language Building Opportunities. Read the "Language Development" section before carrying out the activity.

Site. Select a stream, creek, shallow river, or rocky marine site with water less than 40 cm deep. Sites with rocky bottoms generally have a richer variety of organisms than sites with muddy or sandy bottoms. See the *Leader's Survival Kit* for water-safety suggestions.

Equipment. Cut corks or sponges into a variety of shapes and sizes (ovals, squares, rectangles) up to the size of a walnut. To make small white-bottomed containers out of milk cartons, staple their pouring spouts closed, and cut out the carton wall on the same side as the stapled spout. See the "Hold-It Tough" Equipment Card in the *OBIS Toolbox* folio for instructions on making and using the trough.

Time. Parts I and II require up to an hour and a half total. You may want to do each part on a different day.

ACTION

PART I CHALLENGE: CREATE AN ORGANISM THAT WILL WITHSTAND WATER CURRENTS IN YOUR AQUATIC SITE.

PARTE I, RETO: CREA UN ORGANISMO QUE PUEDA RESISTIR LAS CORRIENTES DE AGUA EN EL ÁREA ACUÁTICA.

Note. Keep nets and troughs out of view or under your control until the second part of the activity.

1. Limit the activity area to a size that allows for easy supervision (ten to thirty meters of a stream, creek, or shoreline).

2. Stand by the water where everyone can see you, and hold up a cork or a sponge. Tell the youngsters that the object represents a plant or animal that might live in the stream. **[Este objeto representa una planta o animal que vive en el arroyo.]** Drop the "creature" into the water to show the kids how organisms can be washed away by currents.

3. Have each of the youngsters get a "creature [criatura]." Challenge them to place their creatures in the water where they *won't* be washed away [donde no sea arrastrada por la corriente].

4. Afterwards explain to the kids that they have just demonstrated one way organisms avoid being washed away: by seeking a spot protected from the current's main force. [**Encontrando un lugar protegido donde los animales no sean arrastrados por el agua. Hablamos una de las maneras en que los organismos resisten la fuerza de las corrientes.**]

5. Now demonstrate the Flood Test [Prueba de Inundación]. Dump a milk carton full of water right next to one of the creatures. Dislodge several creatures with the flood test to point out the need for adding holding devices (such as legs, roots, or hooks) to the creatures.

6. Bring out the junk box and spread out the construction materials. Sticks, rocks, and other materials can also be used. Divide the group into buddy teams [parejas de "compañeros"] and suggest that the teams pick something (a rock, log, plant) in the water for their models to hold onto before they begin making devices. Challenge the youngsters to use the junk-box materials to add holding devices that will allow their creatures to withstand the Flood Test [**Usen los materiales para hacer adaptaciones para que los organismos pasen la Prueba de Inundación.**]

7. Ask the teams to check the holding ability of their creatures by placing them in shallow, fast-flowing water or in surging water. Give each of the teams a milk carton to use for the Flood Test.

8. After youngsters have checked the holding devices they have created, mention that many organisms living in this water also have holding devices [artificios para sujetarse]. These devices are called ***adaptations*** [**adaptaciones**] because they improve the organisms's chances of surviving and reproducing.

PART II CHALLENGE: COMPARE THE HOLDING ADAPTATIONS OF ANIMALS LIVING IN YOUR SITE.

PARTE II, RETO: COMPARA LAS ADAPTACIONES PARA SUJETARSE QUE TIENEN LOS ORGANISMOS QUE VIVEN EN EL ÁREA.

Introduce Part II by telling the youngsters that now they are going to examine the holding devices and behavior of animals living in the site.

1. Introduce and demonstrate the use of bug boxes, white-bottomed containers, and dipnets [cajitas de bichos, envases de fondo blanco y redes para sumergir]. (See the "Aquatic Observation Aids" Equipment Card in the *OBIS Toolbox* folio.) Hand out one set of equipment to each team. Then tell the youngsters to collect a variety of aquatic animals. [**Junten muchos animales acuáticos diferentes.**]

2. After ten to twenty minutes call the teams together and give them the opportunity to share their findings [descubrimientos].

3. With a Hold-It Trough, a dipnet, and some of the captured animals, demonstrate the use of the trough. (See the Equipment Card.) Be sure to place some stream-bottom materials in the Trough.

4. Hand out one trough to each team and ask the teams to compare the holding abilities of their animals. Encourage the teams to look at the shape of the devices (legs, suction disks, hooks) and at the behavior (strong swimming, diving for the bottom, crawling among rocks) of their animals as they hold onto or move through the troughs. [**Comparen las habilidades que tienen los animales para detenerse y observen con cuidado la forma de los artificios o agarraderas (como patas, discos de succión, ganchos) y también el comportamiento (como nadar muy rápidamente, zambullirse hacia el fondo, arrastrase entre las rocas) de estos animales cuando se sujetan o se mueven en el canal.**]

Throughout the activity take full advantage of the spontaneous excitement of the children by encouraging the kids to verbalize their failures and successes. There will be many opportunities for children to describe and compare their discoveries.

LANGUAGE DEVELOPMENT

WHAT DO YOU THINK?

When five to ten minutes remain in the activity period, call the teams back and ask them to describe the holding adaptations that they thought were most effective [**describan las adaptaciones para detenerse que creen que fueron más efectivas**]. Ask:

1. Which animal(s) resisted the strongest currents?
¿Qué animales fueron los más resistentes a las corrientes fuertes?

2. Where were the animals with strong holding abilities found?
¿Dónde fueron encontrados los animales que tenían mayor facilidad para detenerse?

3. What advantages might there be to living in swift currents?
¿Qué ventajas puede tener el vivir en corrientes rápidas?

4. What adaptations would you like to have if you were to live in fast flowing water?
¿Qué adaptaciones les gustaría tener si estuvieran viviendo en aguas de corriente rápida?

Returning the Organisms. Have the youngsters return the animals to the places where they were found. Ask the youngsters to observe how quickly the animals disappear from view.

LANGUAGE ACTIVITY

Have the youngsters sit near the stream and ask them to imagine that they have shrunk to the size of one of the animals in the stream. Ask the youngsters to complete the following sentences (or sentences of your choosing) or use the lead-ins to make up a story. **[Imagínense que se están encogiendo al tamaño de uno de los animales del arroyo. Completen las siguientes oraciones y úsenlas como guías, para hacer cuentos.]**

- ☐ I was just napping when a wave knocked me loose and . . .
  Estaba tomando una siesta cuando una ola me tumbó . . .
- ☐ The best food was in the main current so I let loose and . . .
  La mejor comida que había, estaba en la corriente de agua por lo que me dejé ir y . . .
- ☐ This big fish came by so I let loose and . . .
  Un pez muy grande venía hacia mí por lo que me dejé llevar por la corriente y . . .
- ☐ Last winter when I got caught in a flood . . .
  El pasado invierno cuando quedé atrapado en una inundación . . .
- ☐ There were so many weeds in my part of the stream that I . . .
  Había tantas hierbas en el otro lado del arroyo que yo . . .
- ☐ I like living in this _____ (rock, mud, sand) because . . .
  Me gusta vivir entre _____ (el lodo, las piedras, la arena) porque . . .

MINI-DICTIONARY

adaptation or
adaptación: cualquier característica especial de un organismo que le aumenta las probabilidades de supervivencia y reproducción.

creature or
criatura: otra palabra que se usa para decir organismo, por lo general animales.

current or
corriente: forma de movimiento continuado en una misma dirección, por lo general de agua o aire.

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A Component of the California Plan for the Education of Migrant Children
E.S.E.A., Title 1, P.L. 93-380

Animals face the constant danger of being attacked and eaten. The skins or coats of many animals are marked or colored in such a way that the animals are camouflaged when they are in their ***habitats*** **[*medios*]**. These features protect those animals by hiding them from a ***predator's*** view [de la vista de los ***animales rapaces***].

Some animals also have forms that are similar in shape to objects in their habitat. This feature further camouflages animals from their predators.

Camouflage is one type of animal adaptation. An ***adaptation*** **[*adaptacion*]** is any special feature of an organism that improves its chances of surviving and reproducing. ***Camouflage*** **[*camuflaje*]** is a pattern of colors and shapes that disguises an animal from its predator by allowing it to blend into its habitat.

CHALLENGE: INVENT AN IMAGINARY ANIMAL THAT IS CAMOUFLAGED FROM ITS ENEMIES BY BLENDING INTO ITS HABITAT.

RETO: INVENTA UN ANIMAL IMAGINARIO QUE TENGA CAMUFLAJE Y ASÍ PUEDA COMBINARSE CON EL MEDIO.

OVERVIEW

In this activity the group is divided into two teams. Each team is sent to a separate site, where each youngster constructs a camouflaged animal from a vegetable and places it in a pre-selected habitat. The teams then exchange sites and search for the other team's camouflaged animals. With this experience, the youngsters gain an understanding of one kind of protective adaptation (camouflage).

MATERIALS

For the group:

- bright flagging to mark activity sites (See "Preparation" section.)
- potatoes [papas, patatas]
- stringbeans [habichuelas, ejotes]
- carrots [zanahorias]
- white latex paint and a large brush
- popsicle sticks
- cotton
- glue
- toothpicks
- plasticene or clay
- tempera paint (red, blue, yellow, black, white, and any others of your choice)
- small paint brushes
- masking tape
- plastic cups for mixing paint

For "Colorful Conversation" (under "Language Development"):

1 data board (See *OBIS Toolbox* folio.)
1 package of large index cards

- several pencils
- tempera paints and brushes

PREPARATION

Painting the vegetables. A day before the activity, paint the vegetables white. The white paint will make the vegetables stand out in almost any natural habitat, and camouflaging them will be a definite challenge.

Selecting the sites. Select two different sites in which the youngsters can find habitats for their "animals." The sites should be about 10 m x 10 m and as different as possible (i.e. one in a meadow, one in the woods). They should be far enough apart so that participants at one site cannot watch the participants at the other site position their "animals." Mark the boundaries of each site with some bright flagging (yarn, cloth strips, etc.).

ACTION

1. Discuss the concept of ***camouflage.*** Tell the kids that some animals can be protected from their enemies by being hidden from view. ***Camouflage*** is a pattern of colors and shapes that helps an animal blend in with its surroundings. **[Algunos animales están protegidos de sus enemigos ya que se pueden perder de vista. *Camuflaje* es el arreglo de colores y formas que ayuda al animal a combinarse con los alrededores.]**

2. Hold up some of the painted vegetables and tell the group that what you are holding are "animals." Ask the youngsters what kind of habitat white animals might be hidden in most easily (snow, sand). **[Esto que traigo en la mano son "animales". Nombren algún medio o *habitat* en el que estos animales podrían ser ocultados más fácilmente (nieve, arena).]**

3. Show the kids the boxes of craft materials. Tell them that there is no snow in which the animals can be hidden, so if the animals are to avoid being captured they will need some camouflage (colors and shapes that blend in with the surroundings). **[Como no hay nieve u otro medio blanco en el que los animales sean ocultados, éstos necesitarán tener un camuflaje (colores y formas que los combinen con los alrededores) y así evitar ser capturados.]**

4. Describe the game. Explain that each of two teams will work in a different area, inventing animals that are camouflaged to live there. Tell them that they will go to their areas, look carefully for a habitat for their animals, and camouflage their animals to live in that habitat. **[Cada equipo va a trabajar en un lugar separado e inventar animales con camuflaje para que vivan allí. Para esto, deben explorar el área y cada uno escoger un sitio (o medio) para que su animal viva. Traten de camuflar sus animales para el medio que escogieron.]**

5. Divide the group into two teams. Give each team a box of craft materials and white vegetables and direct them to their sites, reminding them that *each person* has to:

a. Find a place for an animal to live (a habitat). **Encuentren un lugar para que su animal viva (un medio o *habitat*).**
b. Invent an animal to live there using the craft materials and natural materials. **Inventen un animal que viva en el lugar escogido usando los materiales disponibles y otros objetos naturales que se hayen ahí.**
c. Place the animal in the habitat area in plain view, not under anything. **Pongan su animal en su morada a la vista, no debajo de ningún objeto.**

Encourage the youngsters who finish before the others to make another animal.

Note: During this construction period (thirty minutes or so) take advantage of informal conversation. Visit each site and ask the kids to name an animal they know and make up a "fable" about how this animal got its camouflage or adaptation. For example, how the frog became green, why the lizard is brown, etc. Encourage them to make up the stories while you are at the other site. **[Piensen en un animal que conozcan e inventen un cuento acerca de cómo logró obtener su camuflaje o adaptación. Por ejemplo: cómo la rana se hizo verde, por qué la lagartija es café, etc. Traten de pensar en las historietas mientras estoy con el otro equipo.]**

6. When the animals are constructed and in place, call the two teams together at one of the sites. Let the team that placed their animals in that site *watch* while the other team searches for the camouflaged animals. The animals that are *found* should be placed together and identified as "captured [los capturados]." **Note:** If the searchers have difficulty finding some of the animals, the other team can give "hot" and "cold" clues [pistas de "caliente" y "frío"] until all the animals are found.

7. Switch sites and repeat the searching process, with the two teams switching roles.

LANGUAGE DEVELOPMENT

TALKING IT OVER

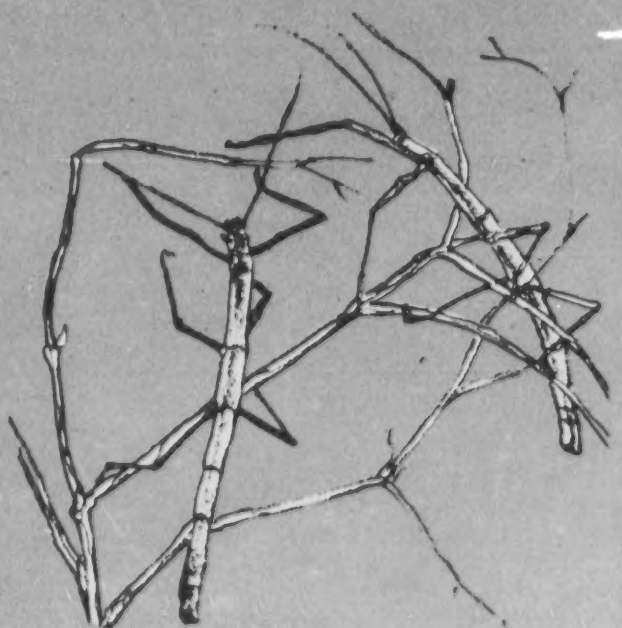
Ask the kids:

1. In what other habitats would your animal be well camouflaged?
¿En qué otros medios estaría tu animal bien camuflado?

2. Name some animals you know that are protected by camouflage. Describe some you have seen.
Nombra algunos animales que tú conozcas que están protegidos con camuflaje. Describe algunos que hayas visto.

3. Name some animals that are not camouflaged. How do you think they are protected from predators?
Nombra algunos animales que no tengan camuflaje. ¿Cómo crees que están protegidos de los animales de rapiña?

Encourage everyone to participate in the discussion.



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INTERCHANGE GAME
JUEGO DE INTERCAMBIO

Ask each team to place the other team's animals in their own site, finding a proper habitat for the "strange" animals. Tell them to exchange sites and look for the animals. **[Cada equipo coloque en su área los animales construídos por el otro equipo y traten de encontrar medios apropriados para los "nuevos" animales. Intercambien áreas otra vez y busquen.]** After the search, discuss the importance of an animal being in a habitat in which it can blend into the surroundings **[lo importante que es que el animal esté en su propio medio para que pueda combinarse y mezclarse con los alrededores]**.

COLORFUL CONVERSATION
DE COLORES . . .

This exercise will give your youngsters more experience with color and a chance to express themselves verbally.

1. Tell the youngsters that color and shade are very important types of camouflage and that they are now going to *make* colors. Each youngster should take from the environment one sample of a color that he or she would like to duplicate (e.g. a leaf, a stick, or a rock). **[Las coloraciones y los tonos son partes muy importantes del camuflaje por lo que será interesante *preparar* colores. Escojan del medio ambiente una muestra cuyo color les gustaría reproducir (p.e)., una hoja, una varita o una piedra).]**

2. Send the youngsters off to search for colored objects. Put out paints, brushes and index cards. When the youngsters return, discuss their findings with them.

3. Demonstrate this procedure for mixing paints:

a. Dip your brush in one color of paint and make a little puddle on an index card.
Sumerge el pincel en pintura de un color y pon una "pastita" en una tarjeta en blanco.

b. *Wash* the brush in water, and then dip it in a second color. Stir the two colors together to make a new one.
***Lava* el pincel con agua y luego, sumérgelo en otro color. Mezcla los dos colores para hacer uno nuevo.**

c. If the color doesn't match that of your sample, get more paint and change the color.
Si el color no resulta como el de tu muestra, coge más pintura y cambia el color.

4. Challenge the kids to make colors that match the colors of their samples **[traten de igualar los colores que tienen los objetos que encontraron]**. Let the kids experiment to achieve the color they want.

5. When everyone has finished, ask them to paste their colored index cards and their samples on the data board. Give each youngster an opportunity to:

a. Show the color she obtained.
Enséñanos el color que obtuviste.

b. Describe how she created her color.
Dinos cómo hiciste este color.

c. Write on the data board a name for the shade of the color (cocoa brown, sky blue, elephant gray, etc.).
Inventa un nombre para el tono del color y escríbelo en el cartelón (café chocolate, rojo bandera, azul cielo, gris elefante, etc.)

MINI-DICTIONARY

habitat or
medio: el lugar donde un organismo vive.

camouflage or
camuflaje: el arreglo de colores y formas que permite al animal combinarse con los alrededores.

predator or
animal rapaz, animal de rapiña o
depredador: el que captura animales o plantas vivientes para su alimentación.

adaptation or
adaptación: cualquier característica especial del organismo que le aumenta las probabilidades de supervivencia y reproducción.

A Component of the California Plan for the Education of Migrant Children
E.S.E.A., Title 1, P.L. 93-380

An observer of natural ***environments*** **[*medios ambientes*]** quickly discovers that most plants and animals are well suited to their environments. Most animals can move to a new location when wind, water, heat, cold, sunlight, dryness, or other animals become a problem. Although plants cannot move to avoid unfavorable conditions, certain characteristics compensate for immobility, allowing plants to live and reproduce in particular environments.

The special characteristics [caracteristicas especiales] that enable plants to survive in specific environments are called adaptations [adaptaciones]. An ***adaptation*** **[*adaptacion*]** is any special feature of an organism that improves its chances of surviving and reproducing.

The barrel cactus [cacto de bola] and the palm tree [palma] are examples of plants that have developed special adaptations in order to survive in specific environments [medios ambientes específicos]. The barrel cactus has sponge-like cells [células esponjosas] for collecting water, allowing it to survive in arid deserts [desiertos áridos]. Palm trees are suited for windy islands because their flexible trunks and fronds can withstand high winds. [Las palmas están adaptadas para vivir en islas airosas ya que sus troncos y frondas son flexibles y pueden resistir ventarrones.]

CHALLENGE: CONSTRUCT A MODEL OF A PLANT THAT IS ADAPTED TO A PARTICULAR ENVIRONMENT.

RETO: CONSTRUYE UN MODELO DE PLANTA QUE ESTÉ ADAPTADO PARA UN MEDIO AMBIENTE ESPECÍFICO.

OVERVIEW

This activity will enable participants to recognize that plants, as well as animals, are well suited to their environments. Using their imaginations and some craft materials, the youngsters construct models of plants that are "adapted" to survive under specified environmental conditions.

MATERIALS

For the group:

- liquid plastic film [plástico líquido] such as Fantasy Film, Fun Film, Form-a-Film, etc. (or cellophane, plasticene, or any material for constructing models of plants)*
- floral tape [cinta floral]*
- thinner* (for plastic goop if it thickens)
- scissors
- thin wire (aluminum works well)
- small pieces of Styrofoam, lumps of clay, or egg carton bases to support "plants" while plastic is drying.

For the "mural" (optional):

1 very large (100 cm by 60 cm) sheet of paper (Butcher paper is ideal.)

- crayons
- transparent tape

*You can obtain these materials at craft or hobby shops.

ACTION

1. Distribute one Action Card [Tarjeta de Acción] to each youngster. Each card has a different problem for the participants to solve. If the youngsters have difficulty inventing, encourage them to look at some of the real plants in the area.

Action Cards [Tarjetas de Acción]

- ☐ Invent a plant that is lawnmower proof.
  Inventa una planta que pudiera ser a prueba de cortadoras de césped.
- ☐ Invent a plant that can live on the surface of a pond.
  Inventa una planta que pudiera vivir en la superficie de un estanque (encima del agua).
- ☐ Invent a plant that can withstand high winds.
  Inventa una planta que pudiera resistir ventarrones.
- ☐ Invent a plant that grazing animals would not eat.
  Inventa una planta que *no* pudiera ser comida por un animal que come pasto.
- ☐ Invent a plant that can hold onto rocks in swift rivers and streams.
  Inventa una planta que pudiera detenerse de las rocas de los ríos o arroyos de corriente rápida.
- ☐ Invent a plant to catch insects.
  Inventa una planta que pudiera atrapar insectos.

INVENT A PLANT
Action Card

How to use Fantasy Film:

1. Form the wire into a basic petal or leaf shape and contour it as you desire.
2. Dip the shaped wire into the Fantasy Film.
3. Stand wire in styrofoam or clay to dry.
4 Group petals together into flower or plant form.
5. Wrap stems with floral tape.
6. Add plastic leaves to stem as you wrap it.

INVENT A PLANT
Action Card

How to use Fantasy Film:

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INVENTA UNA PLANTA
Tarjeta de Procedimiento

Como usar el plástico líquido:

1. Forma un pétalo o una hoja con un pedazo de alambrito, y hazle los contornos que desees.
2. Dá un baño corto a la hoja en el plástico líquido.
3. Inserta la hoja parada en un pedazo de poliestireno *(Styrofoam)* o arcilla, para que se seque.
4. Junta los pétalos y forma una flor o planta.
5. Envuelve los tallitos con cinta para flores.
6. Añade hojas al tallo al envolverlo.

INVENTA UNA PLANTA
Tarjeta de Procedimiento

Como usar el plástico líquido:

1. Forma un pétalo o una hoja con un pedazo de alambrito, y hazle los contornos que desees.
2. Dá un baño corto a la hoja en el plástico líquido.
3. Inserta la hoja parada en un pedazo de poliestireno *(Styrofoam)* o arcilla, para que se seque.
4. Junta los pétalos y forma una flor o planta.
5. Envuelve los tallitos con cinta para flores.
6. Añade hojas al tallo al envolverlo.

INVENTA UNA PLANTA
Tarjeta de Procedimiento

Como usar el plástico líquido:

1. Forma un pétalo o una hoja con un pedazo de alambrito, y hazle los contornos que desees.
2. Dá un baño corto a la hoja en el plástico líquido.
3. Inserta la hoja parada en un pedazo de poliestireno *(Styrofoam)* o arcilla, para que se seque.
4. Junta los pétalos y forma una flor o planta.
5. Envuelve los tallitos con cinta para flores.
6. Añade hojas al tallo al envolverlo.

INVENTA UNA PLANTA
Tarjeta de Procedimiento

Como usar el plástico líquido:

1. Forma un pétalo o una hoja con un pedazo de alambrito, y hazle los contornos que desees.
2. Dá un baño corto a la hoja en el plástico líquido.
3. Inserta la hoja parada en un pedazo de poliestireno *(Styrofoam)* o arcilla, para que se seque.
4. Junta los pétalos y forma una flor o planta.
5. Envuelve los tallitos con cinta para flores.
6. Añade hojas al tallo al envolverlo.

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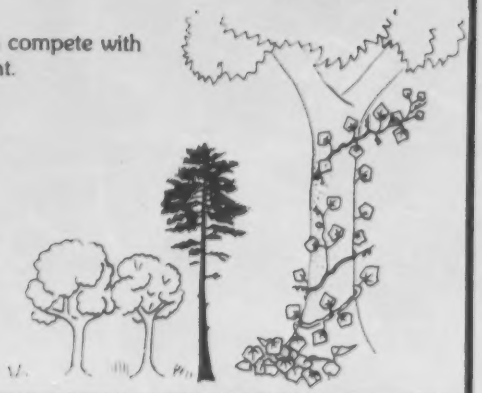
INVENT A PLANT
Action Card

Invent a plant that can hold on to rocks in swift rivers and streams.

INVENT A PLANT
Action Card

Invent a plant that can compete with other plants for sunlight.



INVENT A PLANT
Action Card

Invent a plant adapted to store water.

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INVENT A PLANT
Action Card

Invent a plant to catch insects.

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INVENTA UNA PLANTA
Tarjeta de Acción

Inventa una planta que pudiera almacenar o guardar agua.

INVENTA UNA PLANTA
Tarjeta de Acción

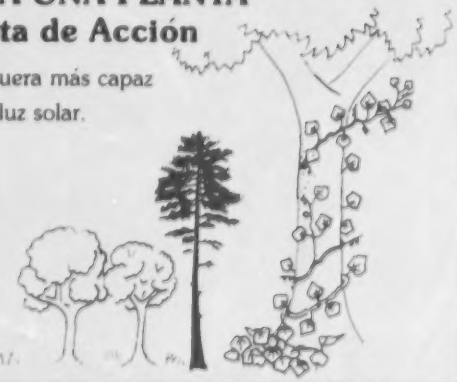
Inventa una planta que pudiera atrapar insectos.

INVENTA UNA PLANTA
Tarjeta de Acción

Inventa una planta que pudiera detenerse en las rocas de los ríos o arroyos de corriente rápida.

INVENTA UNA PLANTA
Tarjeta de Acción

Inventa una planta que fuera más capaz que otras para recibir la luz solar.



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INVENT A PLANT
Action Card

Invent a plant which is lawnmower-proof.

INVENT A PLANT
Action Card

Invent a plant that can live on the surface of a pond.

INVENT A PLANT
Action Card

Invent a plant so it can withstand high winds.

INVENT A PLANT
Action Card

Invent a plant that grazing animals would not eat.

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INVENTA UNA PLANTA
Tarjeta de Acción

Inventa una planta que pudiera resistir ventarrones.

INVENTA UNA PLANTA
Tarjeta de Acción

Inventa una planta que *no* pudiera ser comida por un animal que come pasto.

INVENTA UNA PLANTA
Tarjeta de Acción

Inventa una planta que pudiera ser a prueba de cortadoras de césped.

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INVENTA UNA PLANTA
Tarjeta de Acción

Inventa una planta que pudiera vivir en la superficie de un estanque (encima del agua).

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INVENT A PLANT

1. Form the wire into a basic petal or leaf shape and contour it as you desire.
Forma un petalo o una hoja con un pedazo de alambrito, y hazle los contornos que desees.

2. Dip the shaped wire into the plastic film.
Da un baño corto a la hoja en el plastico liquido.

3. Stand the wire in Styrofoam or clay to dry.
Inserta la hoja parada en un pedazo de poliestireno *(Styrofoam)* o arcilla, para que se seque.

4. Group petals into flower or plant form.
Junta los petalos y forma una flor o planta.

5. Wrap stems with floral tape.
Envuelve los tallitos con cinta para flores.

6. Add plastic leaves to the stem as you wrap it.
Anade hojas al tallo al envolverlo.

☐ Invent a plant that can store water.
Inventa una planta que pudiera almacenar o guardar agua.

☐ Invent a plant that can compete with other plants for sunlight.
Inventa una planta que fuera más capaz que otras para recibir la luz solar.

2. The illustrated directions explain how to use the plastic film. (These instructions also appear on the Action Card.)

Caution: Work in an open area to prevent inhalation of the plastic-film vapors.

Note: If the plastic film should thicken due to prolonged exposure (i.e. lid left off too long), you can mix in thinner to dilute the "goop" to proper consistency.

LANGUAGE DEVELOPMENT

TALKING IT UP

When everyone has finished making a model of a plant, draw the group together. Ask each youngster to show and describe the special features **[muestra y describe las características especiales]** of the plant he or she invented. The other group members should try to guess what environment (i.e. Action Card challenge) the plant is best suited for. **[Traten de adivinar para qué medio ambiente está la planta mejor adaptada.]** To encourage participation, ask the youngsters:

1. In what environment is your plant best suited to survive?
¿Para qué tipo de ambiente está tu planta mejor adaptada para sobrevivir?

2. For what environments is your plant *not* adapted? Why?
¿Para qué tipo de medio ambiente *no* está adaptada tu planta? ¿Por qué?

3. How would your plant change as the seasons change?
¿Cómo cambiaría tu planta con los cambios de estación?

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GROUP "MURAL" (Optional)

Spread out the large sheet of paper for a group mural. Provide crayons and tape. Tell the youngsters that together they are going to draw a mural showing the many ways that plants are adapted for specific environments. Explain to the youngsters that they should each draw in a different area of the mural. The youngsters should tape the plant that they invented onto the paper. Around their plants, they should draw the specific environments or conditions for which the plants are best suited. **[Vamos a hacer un mural que muestre todas las maneras en que las plantas están adaptadas a los diferentes ambientes. Peguen su planta en el mural y dibujen los alrededores en los que la planta vive.]**

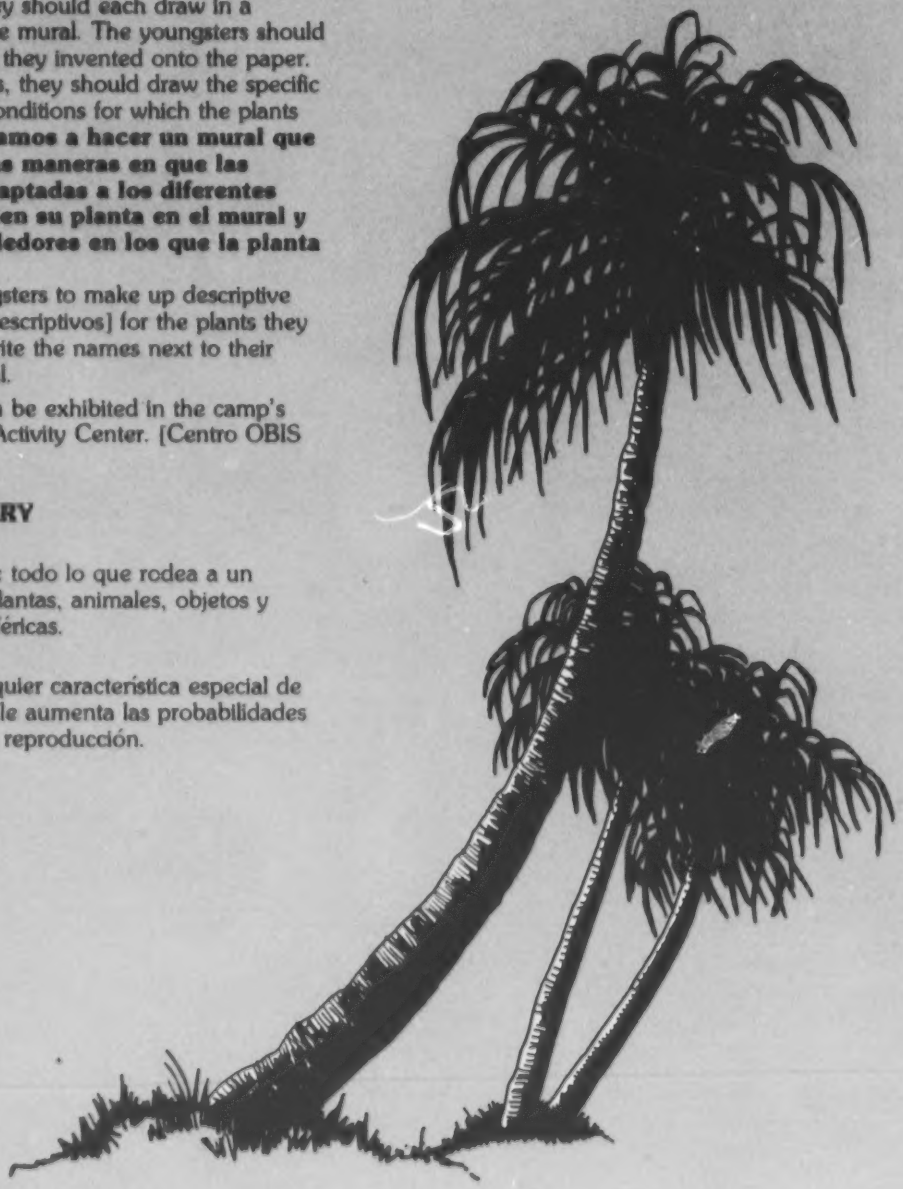
Ask the youngsters to make up descriptive names [nombres descriptivos] for the plants they invented and to write the names next to their plants on the mural.

The mural can be exhibited in the camp's cafeteria or OBIS Activity Center. [Centro OBIS del Campamento].

MINI-DICTIONARY

environment or
medio ambiente: todo lo que rodea a un organismo como plantas, animales, objetos y condiciones atmosféricas.

adaptation or
adaptación: cualquier característica especial de un organismo que le aumenta las probabilidades de supervivencia y reproducción.



The first time most youngsters explore a wilderness site, they usually notice and become fascinated with ***lichens* [*liquenes*]**. Lichens (pronounced "likens") are peculiar little plant-like organisms that grow where most plants cannot: on rocks, trunks of trees, logs, sand, and bare soil. Lichens can be found almost anywhere, from the hot desert to cold coastal beaches. Due to the lichens' susceptibility to air pollution, however, they are relatively rare in large cities.

Lichens come in a variety of sizes, shapes, colors, and textures, and can be placed into three general classifications: crusty, leaf-like, or shrubby. *Crusty* lichens usually grow flat on rocks and tree trunks, and may be imbedded in these surfaces. **[Los líquenes *costrosos* crecen planos encima de las rocas o de los troncos y pueden estar empotrados en las superficies de éstos.]** *Leaf-like* lichens have lobes (rounded projections) that are only partially attached to rocks, trees, or other surfaces. **[Los *tipo hoja* crecen en forma de capa redonda al aire, y estan unidos solo parcialmente a la superficie de los arboles o de las rocas.]** *Shrubby* lichens are branching "plants" that either stand upright or hang from other surfaces. **[Los líquenes *arbustivos* son "plantas" tipo arbusto (con ramaje) que crecen paradas o cuelgan de alguna superficie.]**

Lichens appear in a variety of colors — green, orange, yellow, black, or grey. The shades of these colors vary also.

Lichens take a long time to develop, and any damage to them, however small, could be long lasting. Lichens should therefore be treated with extra care.

CHALLENGE: GO LICHEN-LOOKING AND INVESTIGATE THE VARIETY OF COLORS AND TEXTURES, AND THE DISTRIBUTION OF LICHENS.

RETO: OBSERVA LOS LÍQUENES QUE HAY A TU ALREDEDOR E INVESTIGA LA VARIEDAD DE COLORES Y TEXTURAS, ASÍ COMO LA DISTRIBUCIÓN QUE TIENEN.

OVERVIEW

In this activity, the youngsters look for unusual "plants" — lichens, and discover the locations, sizes, shapes, colors, and animals associated with lichens.

MATERIALS

For each team of two:

1 small bag containing the following items:
- 5 pieces of wax paper (10 cm x 10 cm)
- 1 felt-tip pen with a fine point (to write on wax paper)
- 1 magnifying lens or bug box*
- 1 small plastic bag
- 2 medium-sized plastic bags (one labeled "Lichens" ["Con Líquenes"] and the other labeled "No Lichens" ["Sin Líquenes"]
- transparent tape

4 Lichen Tags (See the "Preparation" section.)
1 Action Card

For the group:

2 sheets of Action Cards
1 meter tape*
1 compass (if you aren't sure of directions)
1 marking pen
1 data board with several sheets of paper (See *OBIS Toolbox* folio.)

Optional. Materials for Action Cards 5a and 5b:

1 plastic or wax paper band (7 cm x 150 cm) marked off in 15-cm sections with felt marker (See the "Preparation" section.)

OR

1 piece of string, 2-3 meters long, marked off in meters.

*Available from the Lawrence Hall of Science. See the "Equipment Order Form" in the *OBIS Toolbox* folio.

PREPARATION

Site. Choose an activity site containing a variety of lichens. Before the group arrives, draw a map of the site on a sheet of your data board. Include specific landmarks (trees, rocks, shrubs, etc.) on the map.

Prepare Lichen Tags [Etiquetas de Líquenes]. Make Lichen Tags by cutting at least two 2 cm x 3 cm pieces of paper for each youngster. The youngsters will be taping small samples of lichens onto the tags, and then posting the tags on spots of the map that correspond to the positions of the lichens in the study site.

OBSERVANDO LÍQUENES
Tarjeta de Acción #1

Los colores de los líquenes

¿Cuántos líquenes de diferente color puedes encontrar?

Cada vez que encuentres un liquen de un color nuevo, corta un pedacito que no sea más grande que ésto ● y pégalo sobre esta tarjeta con cinta adhesiva transparente.

Materiales: cinta adhesiva transparente

OBSERVANDO LÍQUENES
Tarjeta de Acción #2

Las formas de los líquenes

¿Cuántos líquenes de diferente forma puedes encontrar?

Pon una hoja de papel encerado sobre cada liquen de diferente forma que encuentres y calca el contorno (o sea la forma que tiene).

Materiales: papel encerado, pluma

OBSERVANDO LÍQUENES
Tarjeta de Acción #3

Bichos que viven en los líquenes

¿Qué tipos de animales se encuentran en los líquenes? Cada vez que encuentres un animal, ponlo en una cajita para bichos o en una bolsa de plástico y obsérvalo. ¿Qué crees que el bicho hacía en el liquen?

Materiales: cajita de bichos o bolsa de plástico

OBSERVANDO LÍQUENES
Tarjeta de Acción #4

Los líquenes de los árboles

¿Cuáles árboles tienen líquenes y cuáles no?

Arranca una hoja de cada árbol que tenga líquenes y guárdala en la bolsa rotulada "Con Líquenes".

Arranca una hoja de cada árbol que no tenga líquenes y guárdala en la bolsa rotulada "Sin Líquenes".

¿Qué características tienen algunos árboles que impiden el desarrollo de líquenes sobre su corteza?

Materiales: dos bolsas rotuladas

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LICHEN LOOKING
Action Card #3

Lichen Critters

WHAT KINDS OF ANIMALS DO YOU FIND ON THE LICHENS?
Each time you find an animal, place it in the bug box or plastic bag for observation. What do you think the animal is doing on the lichen?

MATERIALS: bug box or bag

LICHEN LOOKING
ACTION CARD #4

Tree Lichens

WHICH TREES HAVE LICHENS AND WHICH DON'T?
Collect a leaf from each tree that has lichens. Keep these leaves in the "LICHEN" bag.

Collect a leaf from each tree that does not have lichens. Keep these leaves in the "NO LICHENS" bag.

What features of some trees might prevent lichen growth on the bark?

MATERIALS: 2 LABELED BAGS

LICHEN LOOKING
Action Card #1

Lichen Colors

HOW MANY DIFFERENT COLORED LICHENS CAN YOU FIND?
Each time you discover a lichen of a new color, break off a tiny piece of the lichen no larger than this ● and tape it to this card.

MATERIALS: tape

LICHEN LOOKING
Action Card #2

Lichen Shapes

HOW MANY DIFFERENT SHAPES OF LICHENS CAN YOU FIND?
Place a piece of wax paper over each different shape and trace its outline.

MATERIALS: wax paper, pen

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LICHEN LOOKING
Action Card #5a

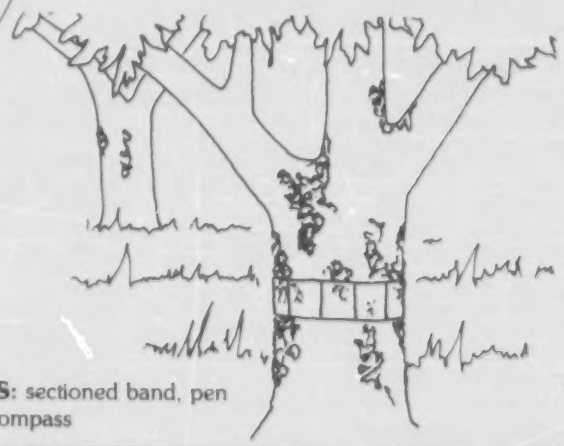
For Plentiful Lichen Populations

HOW MANY LICHENS?
Place the wax-paper band around the trunk of a tree (or around a large rock) so the band end labeled "N" is on the NORTH side of the tree or rock. How many lichens are there in each band section? Use this card to keep score.

10	9	8	7	6	5	4	3	2	1 N

10	9	8	7	6	5	4	3	2	1 N

Try another tree. Are the lichens evenly spaced on the tree or do they grow mainly in certain areas? What might cause this? Do the lichens seem to be clustered on the west, east, north, or south side of the tree?



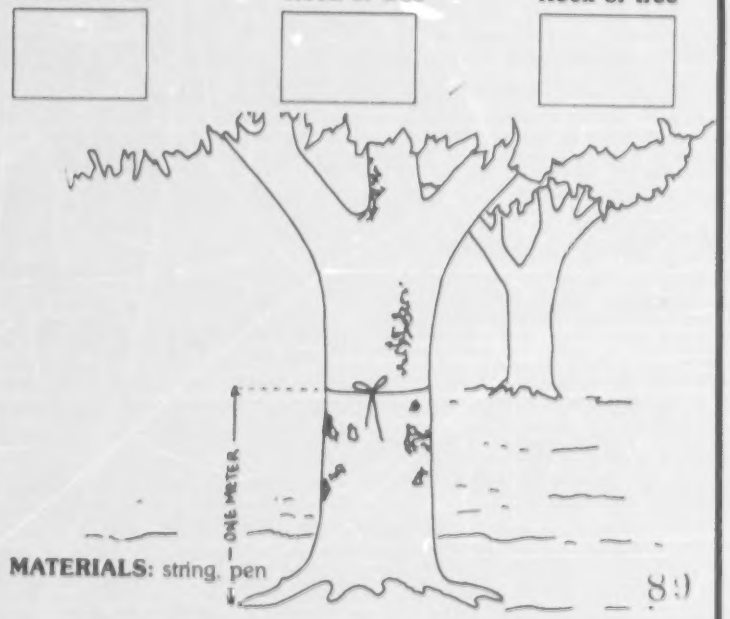
MATERIALS: sectioned band, pen
Optional: compass

LICHEN LOOKING
Action Card #5b

For Sparse Lichen Populations

HOW MANY LICHENS?
Select several trees (or large rocks) with lichens. Tie the marked string around the trunk of one of them, one meter from the base of the tree. You can use the marked-off string to measure one meter. The one-meter area merely limits your counting area. How many lichens are there below the string? Try this on several other trees (or rocks) and compare results. Use this card to keep score.

Rock or tree | **Rock or tree** | **Rock or tree**



MATERIALS: string, pen

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OBSERVANDO LÍQUENES
Tarjeta de Acción #5a

Para áreas de abundante población de líquenes

¿Cuántos líquenes hay?

Ponga la banda de papel encerado alrededor del tronco de un árbol (o de una roca grande) de manera que el extremo de la banda marcado "N", quede al lado norte del árbol o roca. ¿Cuántos líquenes hay en cada sección de la banda? Use esta tarjeta para anotar los resultados.

10	9	8	7	6	5	4	3	2	1 N

10	9	8	7	6	5	4	3	2	1 N

Pruebe con otro árbol. Están los líquenes distribuidos de modo uniforme o están distribuidos principalmente al oeste, este, norte o sur del árbol?

Materiales: banda seccionada de papel encerado y pluma

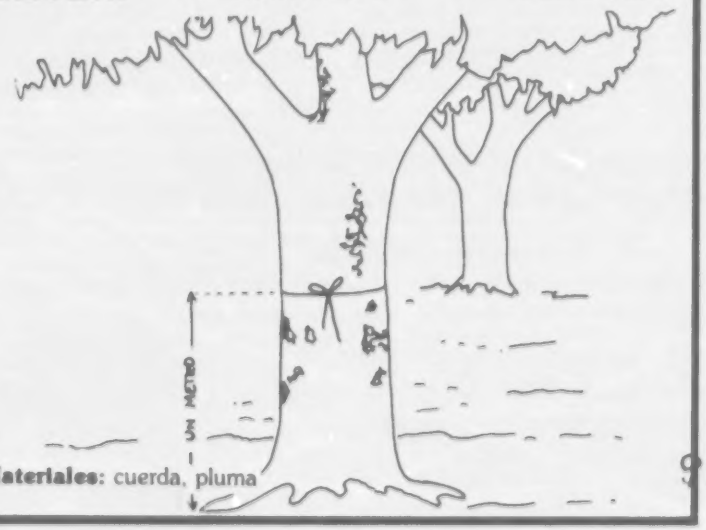
OBSERVANDO LÍQUENES
Tarjeta de Acción #5b

Para áreas de escasa población de líquenes

¿Cuántos líquenes hay?

Seleccione varios árboles (o rocas grandes) con líquenes y enlace una cuerda marcada alrededor del tronco de uno de ellos. Use la marca de un metro en la cuerda para hacer esa medida de un metro de alto desde la base del árbol. Así se limitará la superficie de conteo. ¿Cuántos líquenes hay debajo de la cuerda? Trate con otros árboles (o rocas) y haga comparaciones de los resultados. Use esta tarjeta para anotarlos.

Roca o árbol **Roca o árbol** **Roca o árbol**



Materiales: cuerda, pluma

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Material Bags. Assemble the bags of materials before the group arrives. Know what materials are in the bag and be certain that you can explain to the group how the materials are used. (See the Action Cards for use of the materials.) Decide which Action Cards are most appropriate for your site.

Optional: Action Cards 5a and 5b. You may wish to lead these for the group. Action Card 5a (for areas of plentiful lichen) will require the wax paper (or plastic) strip marked off in 15-cm sections. Indicate North (N) on the right hand section and number sections 1 to 10 from right to left. Card 5b (for areas of sparse lichen) will use a 2-to-3-meter-long piece of string marked off in meters.

ACTION

1. Tell the youngsters that they are going to investigate some interesting "plants" called lichens. **[Vamos a investigar unas "plantas" muy intersantes llamadas líquenes.]** Point out examples of *crusty*, *leafy*, and *shrubby* lichens **[líquenes *costrosos*, *tipo hoja* y *arbustivos*]** to the group, and explain the properties that identify each kind. (See the background information.)

2. **Lichen Map [Mapa de los líquenes].** Define the area in which the youngsters will be "lichen looking," and show the youngsters the map that you have prepared. Ask the group if the map should include any other landmarks. **[¿Hay algunas otras señales que debamos incluir en el mapa?]**

3. Give each child a Lichen Tag and a small piece of clear tape. Challenge the youngsters to go into the study area and find a piece of lichen to tape on the tag. Warn them to take only a small piece of lichen, as lichens take a long time to develop. **[Vayan al área de estudio y tomen un pedacito de liquen para ponerlo en su etiqueta. Cojan muestras pequeñas únicamente ya que los líquenes tardan mucho en crecer.]**

Tell the youngsters to remember where they find the lichen so that when they return with the Lichen Tag they can pin it to the corresponding location on the map. **[Acuérdense de los lugares donde encontraron los líquenes para que cuando regresen con sus etiquetas puedan ponerlas en los lugares correspondientes en el mapa.]** Wish them "lichen luck" and send them off "looking" for about ten minutes.

4. As the youngsters return with their lichen samples, have them pin the tags on the map. **[Peguen las etiquetas en el mapa.]** Give each of the kids another tag, and challenge them to find a different lichen in a different location. (Give them about five minutes to search.)

5. Call the group back to look at the lichen tags on the map. Ask each child to describe to the group where he or she found the lichen, what type of lichen it is (crusty, leafy, shrubby), and its color. **[¿Cómo era el lugar donde encontraste el liquen? ¿De qué tipo era (costroso, tipo hoja, arbustivo) y de qué color?]**

6. **More Lichen Looking.** Divide the group into teams of two, and give each team one materials bag. Describe the materials and their use to the youngsters. Give each of the teams a different Action Card, and send them off to conduct their Action Card investigations.

7. Visit each team, offering assistance if needed and allowing the youngsters to share their discoveries with you. When a team is finished with one card, encourage the youngsters to try another.

8. When most of the teams have finished their Action Card investigations, assemble the group. Encourage each of the teams to describe the results of their investigations. **[¿Qué averiguaste con tus investigaciones?]**

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LANGUAGE DEVELOPMENT

WHAT DO YOU THINK?

1. Do lichens seem to grow more on one side of trees and rocks? Why might this be?
¿Acaso los líquenes crecen más de un lado de los árboles y de las rocas que del otro? ¿A qué crees que se deba esto?

2. Were there any plants on trees other than lichens? Point out any thick, moist, green mounds of moss that might be mistaken for lichens.
¿Había otros tipos de plantas en los árboles que no fueran líquenes? Algunos tipos gruesos y húmedos de *musgos* pueden ser confundidos con líquenes.

3. Do some kinds of lichens grow only on trees? Some only on rocks? Use your map to check.
¿Hay algún tipo de liquen que crece únicamente en los árboles? ¿Alguno que crece únicamente en las rocas? Usen el mapa para comprobar.

4. Why do you think lichens are relatively rare in cities?
¿Por qué piensan que los líquenes son tan raros en las ciudades?

LANGUAGE LINE-UP

1. Call the group together. Tell the youngsters that spoken and written language contains a variety of words. Tell the youngsters that they are going to play a game using one type of word: nouns. Make sure that they know that a noun is a person, place or thing (plant or animal). **[El lenguaje que usamos para hablar y escribir contiene una gran variedad de palabras. Hoy vamos a jugar un juego usando cierto tipo de palabras: los nombres (o sustantivos). Nombre o sustantivo es aquél que se refiere a una persona, lugar o cosa.]**

2. Make a chart on the data board with the headings shown in the illustration.

3. Ask one youngster to select a letter of the alphabet **[escoge una letra del alfabeto]**. Have the group think of nouns that start with the selected letter and that fit under each of the categories. (For example, L: Laura, Los Angeles, lizards, lichens.) Then have the group make up a sentence out of the five words (e.g. *Laura* of *Los Angeles*, feeds her *lizards* with *lichens*.) **[Ahora todos traten de pensar en nombres que empiecen con la letra seleccionada y que le quepan a cada una de las categorías. Traten de formar una oración con las palabras que escogieron. Por ejemplo: *Laura* vive en *Los Angeles* y alimenta *lagartijas* con *líquenes*.]**

4. Let the group repeat the process with other letters.

5. Reinforce the meaning of the word *noun* [*nombre* o *sustantivo*].

MINI-DICTIONARY

lichens or
líquenes: pequeños organismos tipo planta que están formados por un hongo y una alga, que viven en una asociación cercana, beneficiaria para ambos.

moss or
muego: un montón de plantas tipo hoja que se ven como terciopelo húmedo y crecen sobre los troncos de árboles, rocas, etc.

	PERSON	PLACE	PLANT	ANIMAL	NON-LIVING THING
A	ALBERT	ALASKA	ACORN	ANT	AIRPLANE
E	ELI	EGYPT	EGGPLANT	EMU	ELEVATOR
M	MARGARET	MEXICO	MAIZE	MONKEY	MAP

A Component of the California Plan for the Education of Migrant Children
E.S.E.A., Title 1, P.L. 93-380

In the leaves under our feet is a world teeming with animals. As plant parts die and drop to the ground, they form a layer of decaying leaves, sticks, and bark, called ***litter*** **(*hojarasca o desechos naturales*)**. This natural litter layer forms a ***habitat*** **(*medio*)** in which many small animals live.

A litter layer is a constantly changing ***environment*** **(*medio ambiente*)**. Large animals dig through the litter as they look for food, or move the litter as they walk across it. Rain washes litter around, and the wind blows it away. The sun often dries it out, but where the litter is thick, only the upper layers dry out; the layers next to the soil provide a moist environment.

In the moist environments, tiny organisms called ***decomposers*** (fungi and bacteria) [***organismos destructores*** (hongos y bacterias)] break down (decompose) bark, leaves, and twigs into smaller pieces, which provide safe refuge and food for animals living in the litter. Decomposers also release minerals back into the soil. As the lower layers are broken down, new plant material is constantly dropping on top of the existing layer, insuring a continual litter habitat.

Animals that live in litter are generally small, such as insects, slugs, spiders, and salamanders. Small size allows these animals to crawl into tiny crevices between plant and animal matter that is decomposing. The small size also makes these animals easy to overlook.

CHALLENGE: DISCOVER THE DIFFERENT KINDS OF ANIMALS THAT LIVE IN A NATURAL LITTER HABITAT.

RETO: DESCUBRE LOS TIPOS DIFERENTES DE ANIMALES QUE VIVEN EN EL MEDIO DE HOJARASCA O DESECHOS NATURALES.

OVERVIEW

The youngsters investigate the animals that live in litter with the use of a Litter Critter Wheel.

MATERIALS

For each team:

To find and describe litter critters:
2 plastic cups
1 bug box or magnifying lens*
1 index card (to scoop up animals)
1 Litter-Critter Wheel [Rueda de los Bichos de la Hojarasca]†
1 sack (to hold team materials)
1 white-bottomed container (milk carton cut in half lenghtwise)

To record and trace animals:
1 pencil
2 Record Cards [Tarjetas de Datos]† (reproduced on onion skin paper with a ditto machine)
- crayons

For the Language Activity:
1 sheet of regular paper for each team member

For Litter Name Pins [Membretes] (optional):
1 piece of construction paper (14 cm x 10 cm) per child
- pencils
- crayons
- copies of the "Litter-Critter Body-Parts Sheet"† [Hoja de las "Partes del cuerpo de los bichos"]
- transparent tape
- scissors

*Available from the Lawrence Hall of Science. See the "Equipment Order Form" in the *OBIS Toolbox* folio.

†See the inserts in this folio.

PREPARATION

Read the "Litter-Critter Wheel [Rueda de los Bichos de la Hojarasca] Equipment Card" in the *OBIS Toolbox* folio. Duplicate the necessary cards and assemble the wheels.

ACTION

1. At the activity site, challenge the kids to locate and record the kinds of animals that live in the litter **[encuentren y tomen datos de los animales que viven en la hojarasca]**. Explain that you mean *natural* litter [desechos naturales] from plants, and show it to the group.

2. Tell the kids that when searching the site for animals, they can use any method of capture as long as it does not injure the animals. An index card [tarjeta de ficha] can be used to scoop critters into the white-bottomed container.

3. Divide the group into search parties of two. Tell each party to catch [capturar] one to three

WINGS

LITTER CRITTER WHEEL

TITLE SHEET

HEAD

ABDOMEN

How to use wheel:

1. Turn all four wheels so the window shows no body parts.
2. Locate an animal from the litter.
3. Look at it closely.
4. Select a head (the front part) that most closely resembles the head of your critter by turning the head wheel.
5. Next select a thorax, the middle part of the animal.
   How many legs does it have?
6. Then choose an abdomen, the last part.
7. Finally, does your animal have wings?

How to make a record of your critter:

1. Cut out the appropriate body parts from the "Body Parts Sheet" and tape them to a Record Card.
   Or . . . trace your critter on a Record Card.
2. Color your picture to make it more closely resemble the animal you caught.

THORAX

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ALAS

RUEDA DE LOS BICHOS DE LA HOJARASCA

PORTADA

CABEZA

ABDOMEN

Cómo usar la Rueda:

1. Da vuelta a las cuatro ruedas hasta que en la ventana no se vea ninguna de las partes del cuerpo.
2. Localiza un bicho en la hojarasca.
3. Obsérvalo cuidadosamente.
4. Da una vuelta a la rueda de las cabezas para seleccionar una (o sea la parte del frente) que se parezca más a la cabeza de tu bicho.
5. Enseguida selecciona un tórax o sea la parte en medio del animal.
   ¿Cuántas piernas tiene?
6. Ahora selecciona un abdomen (la parte de atrás).
7. Para terminar; ¿acaso tiene tu bicho alas?

TÓRAX

Cómo tomar datos del bicho:

1. Calca el bicho que se muestra en la ventana de la Rueda en una Tarjeta de Datos.
2. Colorea el dibujo para que se vea más parecido al bicho que capturaste.

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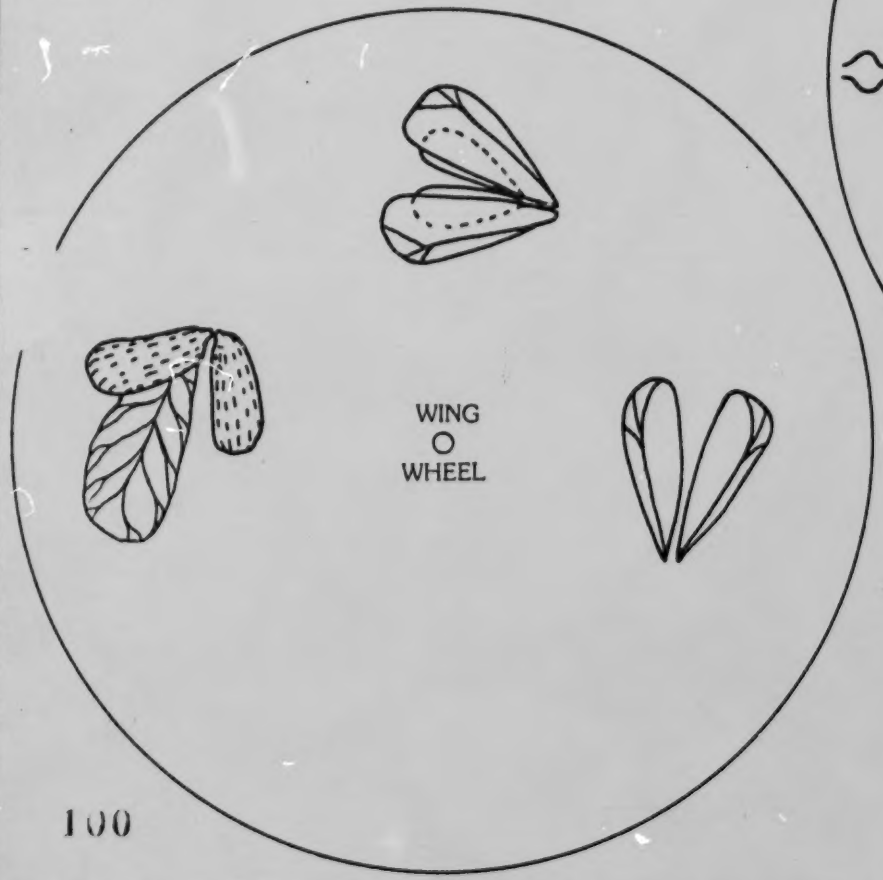
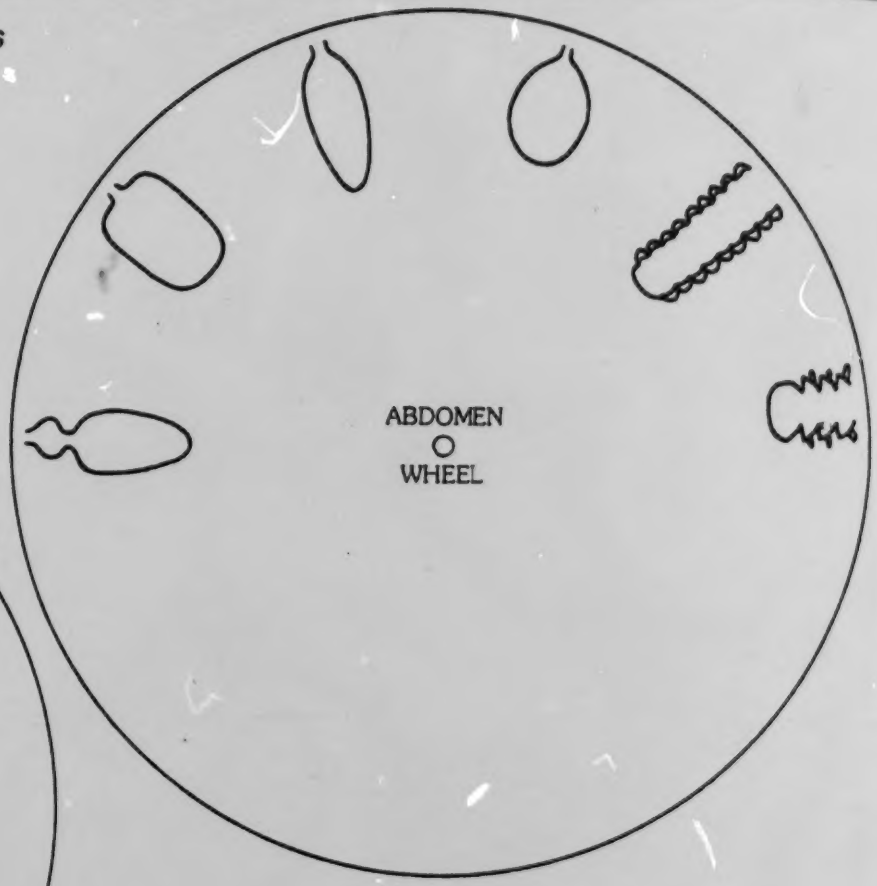
THERMOFAX MASTER, CARD 2
ABDOMEN AND WING WHEELS

Directions: Duplicate these wheels onto an overhead transparency using a thermofax machine or any similar infrared, thermal transparency maker or copy machine. A set of four thermofax transparency wheels is available from the Lawrence Hall of Science. See the "Equipment Order Form" in the *OBIS Toolbox* folio





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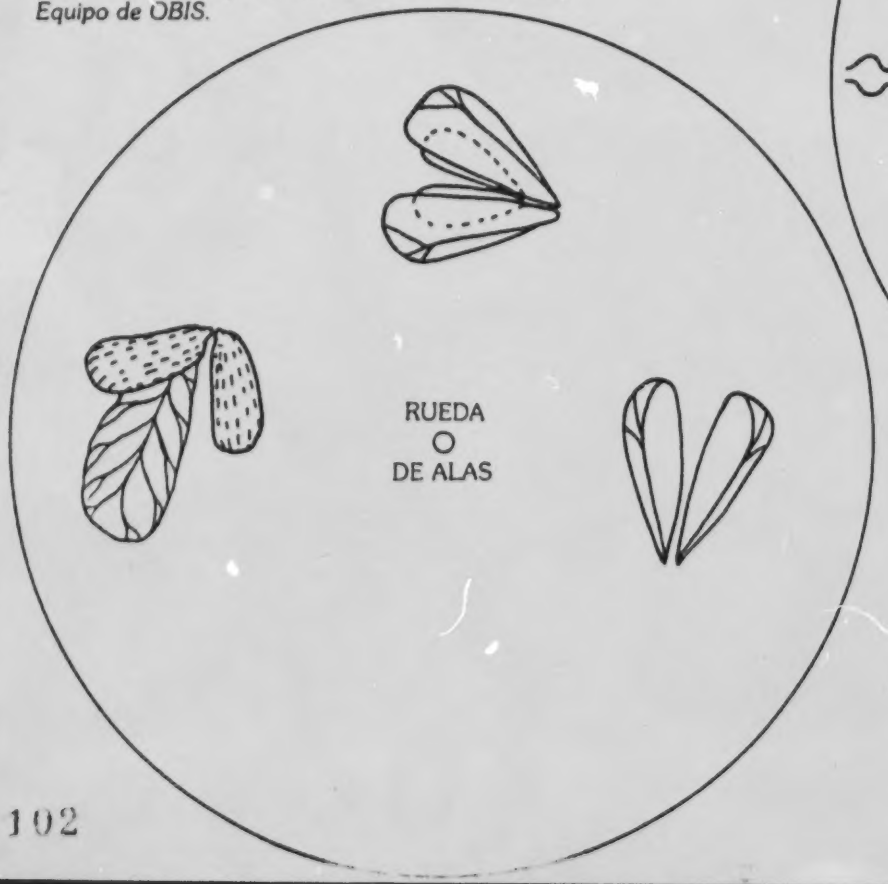
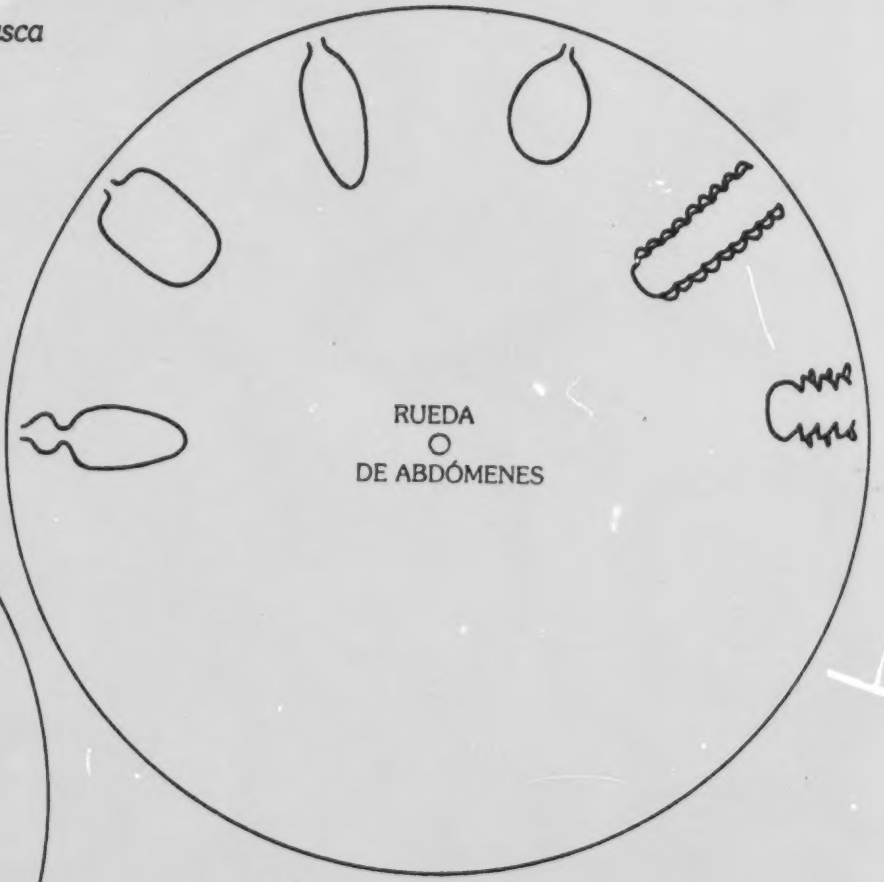
HOJA 2, *thermofax master*
RUEDAS DE ABDÓMENES Y DE ALAS

Instrucciones: Copie estas ruedas en hojas transparentes (transparencias para proyector elevado) usando una máquina copiadora o cualquier otro aparato para duplicar: *Thermofax*, infrarrojo o térmico. Juegos de cuatro ruedas en transparencias *thermofax* se pueden obtener en el *Lawrence Hall of Science*. Use la "Forma para ordenar Equipo" que se encuentra en el folio de *Equipo de OBIS*.





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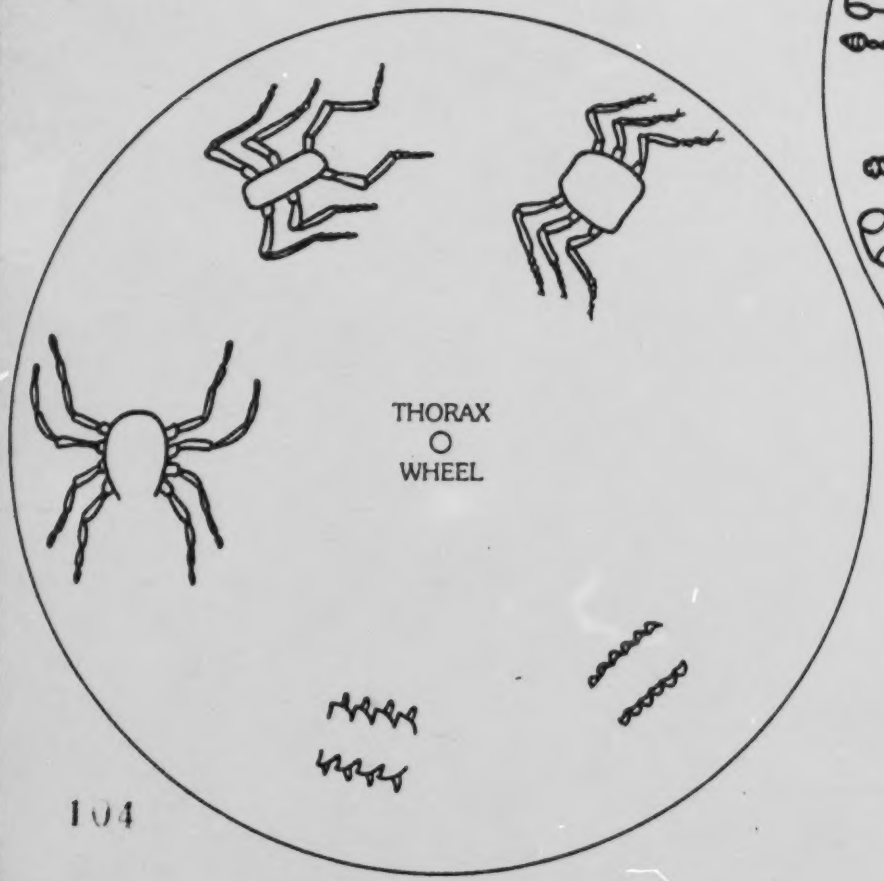
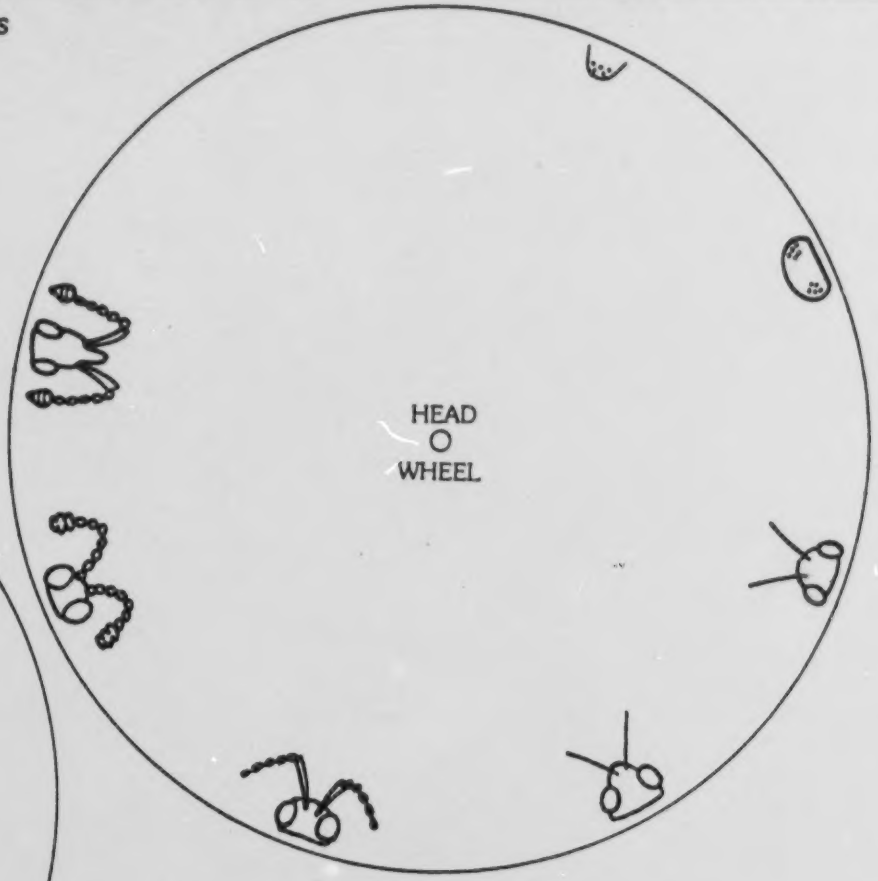
THERMOFAX MASTER, CARD 1
HEAD AND THORAX WHEELS

Directions: Duplicate these wheels onto an overhead transparency using a thermofax machine or any similar infrared, thermal transparency maker or copy machine. A set of four thermofax transparency wheels is available from the Lawrence Hall of Science. See the "Equipment Order Form" in the *OBIS Toolbox* folio.





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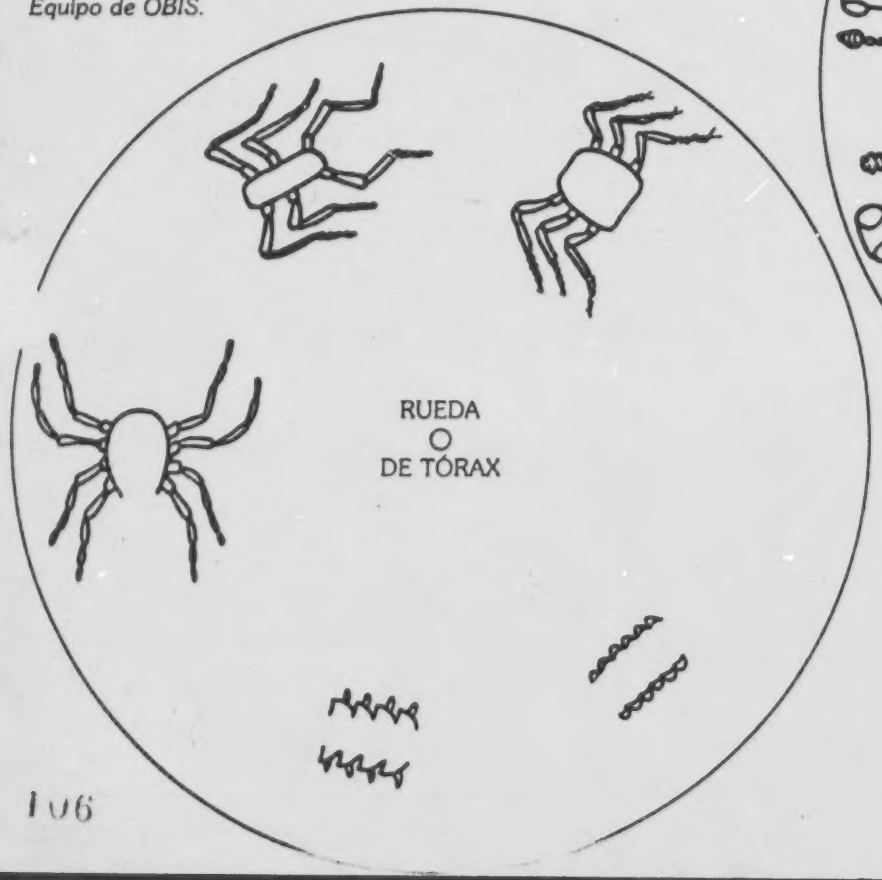
HOJA 1, *thermofax master*
RUEDAS DE CABEZAS Y DE TÓRAX

Instrucciones: Copie estas ruedas en hojas transparentes (transparencias para proyector elevado) usando una máquina copiadora o cualquier otro aparato para duplicar: *Thermofax*, infrarrojo o térmico. Juegos de cuatro ruedas en transparencias *thermofax* se pueden obtener en el *Lawrence Hall of Science*. Use la "Forma para ordenar Equipo" que se encuentra en el folio de *Equipo de OBIS*.



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Litter Critters

BODY-PARTS SHEET

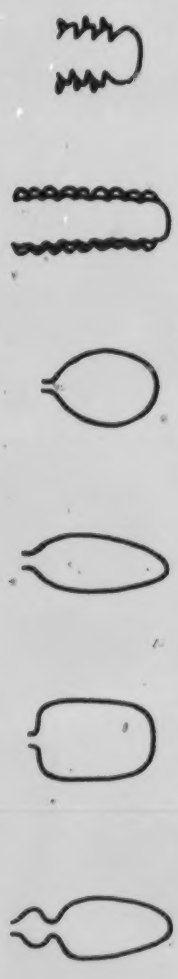
(Use for Litter Name Pins.)

Cut out one of each type of body part and create your own bug. Then color the bug and tape it on your name pin.

HEAD

THORAX

ABDOMEN



WINGS

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Bichos en la Hojarasca

TARJETA DE LAS PARTES DEL CUERPO DE LOS BICHOS

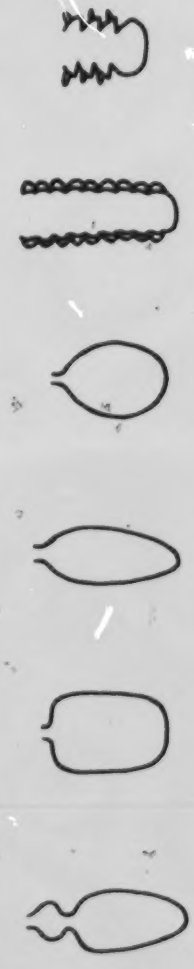
Corta las partes del cuerpo que deseas usar.
Pégalas en el papel cartoncillo y forma un bicho.
Después colorealo y escribe tu nombre al lado del bicho.

(Para los membretes.)

CABEZA

TÓRAX

ABDOMEN



ALAS

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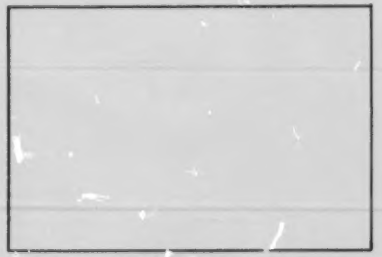
Litter Critter Wheel RECORD CARD

Team _____ Activity Site _____

Date _____

Reconstruct your organism here:



HEAD THORAX ABDOMEN

Size:

(Draw a line as long as the organism.)

- Are there any special color patterns on your organism?
- Draw on any special features you think are important.
- Color your picture to make it more closely resemble the captured organism.

Litter Critter Wheel RECORD CARD

Team _____ Activity Site _____

Date _____

Reconstruct your organism here:

HEAD THORAX ABDOMEN

Size:

(Draw a line as long as the organism.)

- Are there any special color patterns on your organism?
- Draw on any special features you think are important.
- Color your picture to make it more closely resemble the captured organism.

Litter Critter Wheel RECORD CARD

Team _____ Activity Site _____

Date _____

Reconstruct your organism here:

HEAD THORAX ABDOMEN

Size:

(Draw a line as long as the organism.)

- Are there any special color patterns on your organism?
- Draw on any special features you think are important.
- Color your picture to make it more closely resemble the captured organism.

Litter Critter Wheel RECORD CARD

Team _____ Activity Site _____

Date _____

Reconstruct your organism here:

HEAD THORAX ABDOMEN

Size:

(Draw a line as long as the organism.)

- Are there any special color patterns on your organism?
- Draw on any special features you think are important.
- Color your picture to make it more closely resemble the captured organism.

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Rueda de los Bichos de la Hojarasca
TARJETA DE DATOS

Equipo _____

Lugar _____

Fecha _____

Reconstruye tu organismo aquí:

CABEZA TÓRAX ABDOMEN

Tamaño:

(Dibuja una línea del tamaño de tu organismo.)

- ¿Tiene tu organismo algún diseño especial de colores?
- Dibuja los rasgos especiales (o sea las cosas que lo distinguen) que creas sean importantes.
- Colorea tu dibujo para hacerlo más parecido al bicho capturado.

Rueda de los Bichos de la Hojarasca
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different litter animals. Explain that they should not dig into [escarbar] the soil, but just search the litter layer. If some children don't want to dig through the litter with their hands encourage them to explore using a twig or small stick. Note: Ask the group to return [devolver] any logs, rocks, or layers of litter to their original spots after the search is completed. Send out the search parties.

4. When everyone has found some critters, call the youngsters together. Bring out the Litter Critter Wheels. Show the youngsters how to dial the generalized body parts on the Litter Critter Wheel to make a variety of animals. Let them play with the wheels for a while. Now, challenge the youngsters to select one of the critters they found living in the litter and try to match the parts of the bug on the Litter Critter Wheel to "make" the bug they found.

5. Ask the kids to make records of the animals they selected on Record Cards **[tomen datos de los animales en las Tarjetas de Datos]**. Tell the youngsters that they can make records by tracing the outline that appears in the window of the Litter-Critter Wheel. Encourage the kids to use pencils and crayons to make their records more closely resemble [más parecidos] their chosen animals.

LANGUAGE DEVELOPMENT

COMPARING DISCOVERIES

After all the participants have made records of their animals, ask the teams to bring their animals (in cups or bug boxes) and their Record Cards to a central point for comparison [para comparar]. To encourage comparisons ask questions like:

1. How many kinds of animals did the group find?
¿Cuántos tipos de animales encontró el grupo en total?

2. Which animals had all three body parts?
¿Cuales animales tenían sus tres partes del cuerpo?

3. Which animals had wings?
¿Cuáles animales tenían alas?

4. Which areas of the litter contained the most animals? What kinds of animals are found in the moist litter? What kinds are found in the dry litter?
¿En qué capa de hojarasca había más animalitos? ¿Qué clases de animalitos viven en la hojarasca húmeda? ¿Cuáles viven en la hojarasca seca?

5. What were some of the difficulties you had in recording some organisms?
¿Qué dificultades tuvieron al tomar datos de los organismos?

6. What generalizations could you make about color, size, and movements of the litter critters?
¿Qué se puede decir en general acerca del color, tamaño y movimientos de los bichos de la hojarasca?

LITTER LITERATURE

Give each child a regular piece of paper and provide colored pencils and crayons. Have each child write a story [historieta o cuento] about a litter critter [bicho de la hojarasca] she found. The story should include the name of the critter (e.g. Chicho el Bicho), what the critter looks like, where the critter was found, and how she thinks the critter survives (e.g. eats leaves). She can also draw a picture [dibujo] of the litter critter described in her story.

After everyone has completed their critter stories, have each of the children read or describe [lean o cuenten] their litter bug stories to the group. The "litter literature" (critter stories) can be posted in the camp's OBIS Activity Center [Centro OBIS del campamento].

LITTER PINS [MEMBRETES]

Give each youngster a piece of construction paper (14 cm by 10 cm). Provide copies of Litter Critter Body Parts sheets, tape, crayons, and scissors. Tell the youngsters that they are going to create "litter" name pins [tarjetas personalizadas o membretes] for themselves. First, they will take parts from the Litter-Critter Body-Parts Sheet to create their own bug. Then, with crayons, they can color their bugs and tape them on their Litter name pins.

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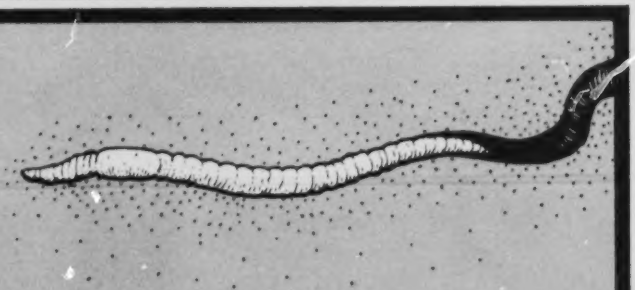
MINI-DICTIONARY



natural litter or
hojarasca o ***desechos naturales:*** capa de hojas, palitos y corteza de árbol en descomposición que cubre el suelo y forma un medio o *habitat* donde muchos organismos viven.

habitat or
medio: el lugar donde vive un organismo.

environment or
medio ambiente: todo lo que rodea a un organismo como plantas, animales, objetos y condiciones climatológicas.

decomposers or
organismos destructores: diminutos organismos (hongos y bacterias) que desbaratan (descomponen) corteza de árboles, hojas y ramitas en pedazos muy pequeños, formado así una capa de desechos naturales.

A Component of the California Plan for the Education of Migrant Children
E.S.E.A., Title 1, P.L. 93-380

Just about every place we go, we are surrounded by plants. Some are large, such as ponderosa pines, mazanitas, and willows. Others are quite small, such as crab grass and thistles. The variety and sizes of plants in an area depend on the type of ***environment* [*medio ambiente*]**. The plants growing in a lawn or around the buildings in a city are usually very different from the plants growing in a forest or a desert.

When two plants (e.g. corn and pumpkin plants) are different from each other, scientists say they are distinct species (speé-seez). A ***species* [*especie*]** is a kind of plant (or animal) that is different from all other plants (or animals). Lima beans and pinto beans are both beans and therefore quite similar. However, they are different kinds of beans, so they represent two distinct species.

OVERVIEW

In *Plant Hunt* [*La Búsqueda de Plantas*] the youngsters gather and sort small samples of plants to find out how many species of plants are growing in the study site. The youngsters use a chart [tabla o diagrama] to help them organize the results of their hunt.

CHALLENGE: FIND AS MANY SPECIES OF PLANTS AS YOU CAN IN YOUR STUDY SITE.

RETO: ENCUENTRA TODAS LAS ESPECIES DE PLANTAS QUE PUEDAS EN EL AREA DE ESTUDIO.

MATERIALS

For each team of two:
1 plastic bag (sandwich size)
1 magnifying lens [lente de aumento]

For the group:
- transparent tape
2 data boards
1 marking pen
2 or 3 copies of the *Lawn Guide* [*Guia para el Prado*] for small plants

PREPARATION

1. Prepare two data boards. (See the *OBIS Toolbox* folio.)

2. Select a site for the *Plant Hunt* [*La Búsqueda de Plantas*]. Keep the working area small enough to allow you to keep track of the youngsters.

Note: When you are defining the term ***species***, note that the term in Spanish *especie* can be mispronounced *especia*. *Especia* is what we use to season food, i.e. spice.

ACTION

1. Organize the group into teams of two [equipos por parejas]. Give each team a bag and a magnifying lens. Define the boundaries [límites] of the study site.

2. Challenge each team to find and collect as many species of plants as they can in the site. **[Encuentren todas las especies que puedan en el área de estudio.]** Tell the youngsters that ***species*** is a word that scientists use to refer to a distinct kind of plant or animal. A species of plants or animals is different from all other kinds of plants and animals. **[*Especie* es una palabra que se usa en ciencia para referirse a una clase distinta de planta o animal. Por lo tanto, una planta de una especie es diferente a cualquier otra.]**

Tell the youngsters to take only *small* samples [muestras *pequeñas*] so as not to harm the plants. Tell them to keep the samples in the plastic bags, and send them off to hunt.

3. When every team has taken one sample from as many different kinds of plants as they can find, call them back together. Ask, "How many species of plants are growing here? **[¿Cuántas especies de plantas crecen en este lugar?]**" Responses will vary. After acknowledging responses, suggest putting the samples together to find out how many species of plants the whole group found.

4. **Organizing the samples.** Make a grid on the data board, and number the squares. Now ask one team to pick one of their plant samples and put it in species square #1. Have the rest of the teams check to see if they have a sample of that species and, if they do, have them add it to the other sample(s) in square #1.

5. Have a second team select a new sample and place it in square #2. Have the other teams match and place samples as before. Keep going around the circle of youngsters until all the samples are displayed on the board by species. (You may have to mark off a second data board if the group runs out of squares in which to place samples.)

6. Make your display permanent by taping all of the samples in their specific squares.

LANGUAGE DEVELOPMENT

QUESTIONS AND DISCUSSION

1. How many different kinds or species of plants did the whole group find?
¿Cuántas especies de plantas encontró el grupo en total?

2. How do the leaves of various plants differ? Have each team select two plants and describe to the others how the leaves differ. Let them use magnifying lenses for a closer observation.
¿En qué se diferencian las hojas de las diversas plantas? Escoge dos hojas y di a los demas en que difieren éstas. Usa un lente de aumento para observarlas más detalladamente.

LANGUAGE GAMES

1. **The Species Game [Juego de Especies].** Reinforce the idea of species with a game. Tell the youngsters that you will name two similar species of plants or animals and they will suggest one way in which the two species are similar, and one way in which the two species are different. **[Voy a nombrar dos especies parecidas de plantas o animales y ustedes me dirán una manera en que las especies son parecidas y otra en la que son diferentes.]** Examples:

a. lions and tigers
leones y tigres
b. horses and zebras
caballos y cebras
c. snakes and lizards
víboras y lagartijas
d. house flies and mosquitoes
moscas y mosquitos (zancudos)
e. cabbage and lettuce
coles y lechugas

Give everyone a chance to make a comparison of two species for their friends to compare.

2. **The Name Game [Juego de Nombres].** Ask the kids to make up descriptive names for the plants they collected and to write them on the data board. A descriptive name tells something about the plant. For instance, a thistle (very prickly) might be called *needle weed.* **[Un nombre descriptivo es aquél que nos dice algo acerca de la planta. Por ejemplo, un cardo (muy puntiagudo) le podríamos poner *hierba con agujas.*]** Have the youngsters work as a group or in teams. Make sure everyone is involved.

3. **The Branch-Off Game [Escribiendo en Ramificaciones].** Write the name of one plant vertically on a sheet of data board paper. Use the letters [letras] of the name for first letters of ***properties* [*propiedades*]** of that plant. For example, the word *orange* [*naranja*]:

Orange	**N**atural
Round	**A**gria
Appetizing	**R**edonda
Natural	**A**petitosa
Good	**N**aranja
Edible	**J**ugosa

Ask the youngsters to do the writing or write the words yourself, whichever is most appropriate for the situation. Note: If the kids can't think of properties starting with each letter in the word

(orange), encourage them to think of properties using the letters any place in the word.

smo**O**th	**N**atural
cit**R**us	jugos**A**
e**A**table	ag**R**ia
ora**N**ge	**A**paga la sed
fra**G**rant	redo**N**da
sw**E**et	anaran**J**ada
	apetitos**A**

4. **Plants and People [Plantas y Personas].** Challenge the youngsters to select a plant that reminds them of a friend, family member, or teacher. Have each youngster tell the group what plant he has selected, who it reminds him of and why. **[Escojan una planta que les recuerde a algún amigo, familiar, maestro, etc. y enséñenla al grupo. Di a quién te recuerda y en qué se parece a esa persona.]**

MINI-DICTIONARY

species or
especie: una clase distinta y única de planta o animal. Difiere de todas las demás plantas o animales.

properties or
propiedades: las características, rasgos, o cualidades de un objeto u organismo como tamaño, color, forma, textura, olor, etc.

environment or
medio ambiente: todo lo que rodea a un organismo como plantas, animales, objetos y condiciones climatológicas.

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***Plant distribution* [*distribucion de plantas*]** is the arrangement of growing plants in an area.

Plants grow in certain places because environmental conditions in those places are suitable for the germination of seeds and the continued growth of adult plants. ***Environmental factors* [*factores ambientales*]** include temperature, light, moisture, soil type and available minerals, wind, and other plants competing for the same resources. Animals, including man, also affect distribution patterns.

Consider the following examples of the effect of water on plant distribution. The wind widely disperses cattail seeds, but only those that land in or around fresh water grow. Willow trees grow in ravines, but cannot survive on the drier hilltops where only drought-resistant plants grow.

OVERVIEW

In this activity, the youngsters observe plant distribution patterns. By collecting leaf samples and mapping the arrangement of plants in the area, the youngsters try to determine the environmental factors responsible for these patterns.

CHALLENGE: LOCATE AND MAP THE EIGHT MOST IMPORTANT PLANTS IN YOUR TEAM'S SECTION OF THE STUDY SITE.

RETO: ENCUENTRA Y SEÑALA EN UN MAPA LAS OCHO PLANTAS MÁS IMPORTANTES DE TU ÁREA.

MATERIALS

For each team of two or three:

1 data board with a section of the map (See the "Preparation" section.)
1 marking pen
2-3 collection bags
1 bag containing 8 different colors of adhesive labels, 40 labels of each color (or squares or dots of contact paper, crayons, or colored construction paper and glue). A good size range for the labels is 1.5 to 3 cm.

For the group:

- ribbon or flagging

1 data board with at least three sheets of paper (one for leaf identification key and two for the "Plant Chatter" section)
1 marking pen

PREPARATION

Site. In choosing your study site, keep in mind that an *unmanaged* area (vacant lot or field) shows the influence of natural environmental factors on plant distribution. A *managed* area (garden or park), illustrates man's influence. The best study site is one containing both types of areas where teams could compare different plant patterns. If necessary, obtain permission to take leaf samples from the plants in your site.

Team Areas [Áreas de los Equipos]. Each team of two or three should work in an area about 8-10 meters square. These areas must all be adjacent. To avoid confusion, mark the corners of each of the sections in the study area with ribbon or flagging.

Overview Map [Mapa del Área]. Prepare the basic overview map ahead of time. Draw an overview map on 3 or 4 data boards pushed together. The physical structures of the study site, including streams, roads, sidewalks, and buildings, should be represented on the map. Do *not* include plants. If there are four teams, the map should cover four data boards. Each team will be assigned a portion of the study area and the corresponding map section.

ACTION

MAKING THE LEAF-IDENTIFICATION KEY

1. Tell the youngsters that they will be collecting representative samples from the five "most important" plants in the activity area. **[Colecten muestras que representen cinco de las plantas "mas importantes" que hay en la region.]** You may wish to offer a few suggestions as to what makes a plant important: its size, its economic significance, its beauty, its aroma etc., but let each child decide which plants are "most important."

2. Set the limits [los límites] of the study site, and review the conservation ethic with regard to taking leaf samples. (See the *Leader's Survival Kit* folio.) Warn the group to avoid poison oak, ivy or sumac, and point these plants out to the group ahead of time. **[Tengan cuidado y no toquen estos tipos de plantas.]** Send the youngsters off to collect the samples.

3. When the youngsters return, ask them to sort the samples by placing all of the leaves of the same type in one place. Ask them how they decided which plants were most important. **[Acomoden las muestras y pongan todas las hojas de un mismo tipo en un sólo lugar. ¿Qué fue lo que tomaron en cuenta para decidir cuáles plantas eran las más importantes?]** The 8 plants selected most often by the group will be named the 8 most important plants in the area.

4. Construct the leaf identification key [clave para la identificación de las hojas] by taping one sample of each of the 8 plants to the group data board. Stick a label of a different color next to each sample. Allow the youngsters to choose the labels for the plants and place them on the data board.

MAPPING THE DISTRIBUTION OF PLANTS

1. Display the overview map of the study site and orient the group. Ask the youngsters if they think any landmarks other than the ones you marked should be included. **[¿Hay algunas otras marcas o señales en el lugar que deberían ser incluídas?]** If so, add them.

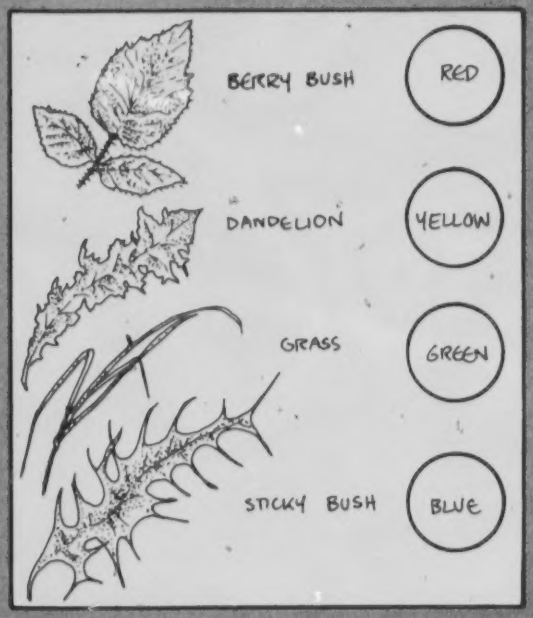
2. Separate the map into its sections, and divide the group into teams of two or three. Give one section to each of the teams and help them find their sections of the site.

3. Introduce the challenge: Using the colored labels representing different plants, FIND AND MAP THE LOCATION OF THESE PLANTS IN YOUR SECTION OF THE STUDY SITE. **[ENCUENTRA Y SEÑALA EN EL MAPA DE TU SECCIÓN DEL ÁREA, LA LOCALIZACIÓN DE LAS PLANTAS MÁS IMPORTANTES.]**

4. Describe the Action:

a. First, each of the teams duplicate the leaf-identification key on their sections of the map by taping to their boards samples of the leaves and their corresponding labels. **Cada equipo debe copiar en su sección del mapa, la clave para la identificación de las hojas. Peguen muestras de las hojas con sus correspondientes etiquetas en sus cartelones.**

b. The teams take their data boards and labels and survey their study areas. Each time someone finds one of the eight plants, he or she should place the corresponding colored label at the appropriate location on the map. **Salgan a hacer el estudio con sus cartelones y etiquetas en la mano. Cada vez que encuentren una de las ocho plantas, deben pegar la etiqueta del color correspondiente en el cartelón, en el lugar aprópiado.**



5. When everyone is finished surveying and mapping, put the sections of the map together and gather for a group discussion. Each of the teams should briefly describe the plant patterns revealed on their sections of the map. **[Cada equipo deberá describir brevemente la distribución de plantas que se muestra en su mapa.]**

LANGUAGE DEVELOPMENT

WHAT DO YOU THINK?

1. What is the most common color on the overview map and which plant does it represent? The most abundant plants in an area are called ***dominants.*** Dominant plants cover more space or are larger than others and usually have a controlling influence on other organisms in the area. What are the dominant plants in your study area?
¿Cuál es el color más abundante en el mapa y a qué planta representa? Las plantas más abundantes en un área son llamadas *dominantes*. Las plantas dominantes son aquellas que ocupan más espacio o son más grandes que las otras y

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por lo general tienen una influencia de control sobre los otros organismos en el área. ¿Cuáles son las plantas dominantes en tu área de estudio?

2. Do certain colors appear next to each other several times on the map? Why might this be?
¿Hay algunos colores que aparezcan juntos varias veces en el mapa? ¿Por qué crees que sea esto?

3. Introduce the meaning of ***plant distribution:*** the arrangement of plants in an area. Which ***environmental factors*** (light, wind, rain, soil) might have affected the distribution of the plants we found?
La distribución de las plantas **es la abundancia y localización de éstas en una región. ¿Qué *factores ambientales* afectan la distribución de las plantas que encontramos?**

4. Animals, including man, are also considered environmental factors. What effect do animals and man have on the distribution of plants in your area?
Los animales, incluyendo el hombre, también están considerados como factores ambientales. ¿Qué efecto crees que tengan éstos en la distribución de las plantas en tu área?

5. Ask the youngsters if they noticed any animals or ***evidence*** of animals (fur, feathers, footprints) on or near any of the plants.
¿Vieron algún animal o *evidencia* de animal (como piel, plumas, huellas) en alguna de las plantas?

PLANT CHATTER

Tell the group that certain arrangements of letters make specific written words. Words represent objects or ideas. If the letters are jumbled up, it is difficult to decide what object or idea is being expressed. **[Las palabras representan objetos o ideas. Cuando las letras están revueltas es difícil saber qué es lo que se quiere decir.]**

Write the following sentences containing jumbled words on a data board.

a. **Las *maspal* crecen en las *lasis*.** *(lmpa* trees grow on *slaisnd.)*
b. **Los *toscac* crecen en el *sierdeto*.** *(sctuca* grows in the *sedert.)*
c. **Los *nospi* crecen en las *tamonñas*.** *(nepi* trees grow in the *uomntains.)*
d. **Los *blesro* crecen en los *rosce*.** *(ako* trees grow in the *shlll.)*
e. **Las *bashier* crecen por todos *dosla*.** *(dewes* grow almost *ewnahyre.)*

Challenge the group to arrange the letters so that the correct words are expressed. **[Arreglen las letras para que aparezcan las palabras correctas.]**

Answers [Respuestas]:
a. ***palmas*** e ***islas*** *(palm* and *islands)*
b. ***cactos*** y ***desierto*** *(cactus* and *desert)*
c. ***pinos*** y ***montañas*** *(pine* and *mountains)*
d. ***robles*** y ***cerros*** *(oak* and *hills)*
e. ***hierbas*** y ***lados*** *(weeds* and *anywhere)*

If the youngsters enjoy working with jumbled letters, suggest that a volunteer from the group write a jumbled word on the data board and give a hint (i.e. person, place, plant, animal, or object). The other group members try to guess the word. Encourage each youngster to write a jumbled word on the data board.

MINI-DICTIONARY

plant distribution or
distribución de plantas: la abundancia y localización de las plantas en una región.

environmental factors or
factores ambientales: los factores que rodean a un objeto como temperatura, luz, humedad, tipo de tierra, animales, etc.

dominant plants or
plantas dominantes: las plantas más abundantes o destacadas de una región.

evidence or
evidencia: una manifestación o indicación de que algo ha sucedido en un lugar.

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When you look at an animal that lives on the land, you can usually see the entire animal from its head to its tail. But when you look at a plant that lives on the land, how much of it can you really see? Above ground, a typical flowering plant has a ***shoot*** consisting of a stem with branches, leaves, and flowers [un ***tallo*** que *sostiene* a las ramas, hojas y flores]. But hidden below the ground are the ***roots*** [***raíces***] which consist of "branches" and fine root hairs.

Some functions of roots are:

1. Anchoring the plant in the soil.
2. Absorbing water and dissolved mineral salts from the soil and conducting them to other parts of the plant.
3. Storing food products made by the green parts of the plant.

Different plants have different kinds of roots. Grasses, including grains such as wheat, oats, corn, and rice usually have slender, fiber-like roots with no one root more prominent than others. This kind of root structure is a ***fibrous root*** system [red de ***raíces fibrosas***]. Other plants, such as the dandelion (a weed) or food crops such as carrots, beets, and radishes, have one large main root called a ***tap root*** [***tuberculo***]. Such plants store large amounts of food in these large tap roots.

The same kind of plant growing under different ***environmental conditions*** [***condiciones ambientales***] (such as different soil texture or amount of soil moisture) often shows variation in its root system. For example, a plant growing at the edge of a pond may have a shorter root system than the same kind of plant growing in drier soil. Near the pond, water is available much closer to the soil surface, and there is little need for the root to grow further.

CHALLENGE: FIND PLANTS WITH ROOTS LIKE THOSE OF THE TWO MYSTERY PLANTS.

RETO: ENCUENTRA PLANTAS CON RAÍCES PARECIDAS A LAS RAÍCES DE LAS DOS PLANTAS MISTERIOSAS.

OVERVIEW

Roots and Shoots is an activity designed to motivate youngsters to investigate roots. Using roots as their only clues, the teams seek to identify two mystery plants by digging up and comparing roots to find some that match those of the mystery plants.

MATERIALS

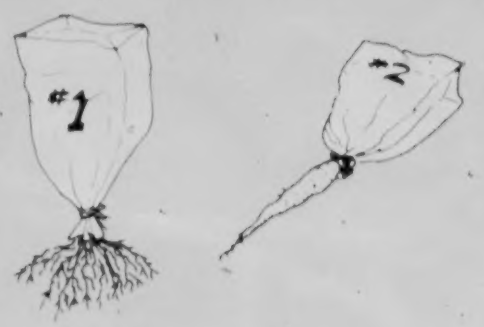
For each team of two:
1 trowel
1 plastic or paper bag
1 magnifying lens (optional)

For the group:
1 data board (See the *OBIS Toolbox* folio.)
1 marking pen
2 large brown paper bags
• string to close the bags
1 bucket of water
1 set of Action Cards
1 "Roots, Prefixes, and Suffixes" card (included in this folio)

PREPARATION

1. **Site.** The best site for this activity is a weedy lot, lawn, garden, or an old field. Be sure to obtain permission, if necessary, to dig up the weeds in your study site.

2. **Mystery Plants [Plantas Misteriosas].** Dig up two plants, one with fibrous roots (a grass plant) and one with a tap root (dandelion, thistle etc.). Place a brown bag over each plant *shoot* so that *only* the roots are exposed. Secure the bag tightly with tape or string. The fibrous-root plant will be Mystery Plant #1; the tap root will be Mystery Plant #2.



ROOTS AND SHOOTS
Action Card #3

FIND:

a plant with a wider root system than shoot system,

and

a plant with a wider shoot system than root system.

ROOTS AND SHOOTS
Action Card #4

FIND:

a plant with longer roots than shoot,

and

a plant with a longer shoot than roots.

ROOTS AND SHOOTS
Action Card #1

FIND:

a plant with a new type of root system, one that has not been found.

ROOTS AND SHOOTS
Action Card #2

FIND:

a plant with a thicker main shoot than main root,

and

a plant with a thicker main root than main shoot.

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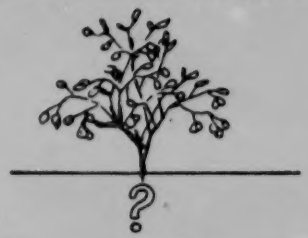
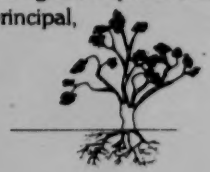
TALLOS Y RAÍCES
Tarjeta de Acción #1

ENCUENTRA:
una planta con una red de raíces diferente, que nadie haya encontrado.



TALLOS Y RAÍCES
Tarjeta de Acción #2

ENCUENTRA:
una planta con un tallo más grueso que la raíz principal,



y

una planta con una raíz principal más gruesa que el tallo.

TALLOS Y RAÍCES
Tarjeta de Acción #3

ENCUENTRA:
una planta con una red de raíces más ancha que el tallo y follaje,

y

una planta con un tallo y follaje más ancho que la red de raíces.

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TALLOS Y RAÍCES
Tarjeta de Acción #4

ENCUENTRA:
una planta con raíces más largas que el tallo,

y

una planta con el tallo más largo que las raíces.

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ROOTS AND SHOOTS
Action Card

ROOTS AND SHOOTS
Action Card

ROOTS AND SHOOTS
Action Card #5

FIND:

a plant with more root branches than shoot branches.

and

a plant with more shoot branches than root branches.

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ROOTS AND SHOOTS
Action Card

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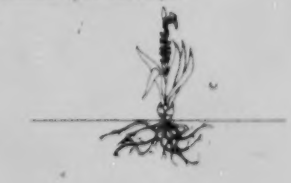
TALLOS Y RAÍCES
Tarjeta de Accion #5

ENCUENTRA:

una planta con más raíces que ramaje,



y

una planta con más ramaje que raíces.

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TALLOS Y RAÍCES
Tarjeta de Acción

TALLOS Y RAÍCES
Tarjeta de Acción

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TALLOS Y RAÍCES
Tarjeta de Acción

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Roots and Shoots

PREFIXES, ROOTS, AND SUFFIXES

PREFIXES	ROOTS	SUFFIXES
ex-	fix	-ed
re-	turn	-er
un-	place	-ing
pre-	port	-ance
post-	press	-ly
in-	act	-lon
im-	form	-ment
con-	sent	-able
de-	serve	-al
en-	side	-ture
non-	real	-ity
com-	mark	-ent
sif-		-ant

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Tallos y Raíces

PREFIJOS, RAÍCES Y SUFIJOS

PREFIJOS	RAÍCES	SUFIJOS
ex-	traer	-ido
re-	conocer	-ida
des-	pegar	-or
pre-	decir	-ora
pas-	lógico	-ción
in-	parar	-ante
en-	ir	-able
i-	tratar	-mente
com-	poner	-al
sub-	plantar	-ura
con-	responder	-dad
post, pos	ganar	-ente
trans-	ocupar	-ado
co-	emplear	-ada
ante-	vivir	
poli-	comunicar	
mini-	etc.	
a-		

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3. **For the "Words Have Roots Too" section.** Copy the list of root words, prefixes, and suffixes on a data board sheet.

ACTION

1. Explain to the youngsters that they will investigate the weeds in their study site, particularly the part of the weeds that they rarely see, the roots. Tell them that the above-ground part of the plant is the ***shoot,*** which consists of the stem, branches, leaves, and flowers [el ***tallo*** que *sostiene* a las hojas, ramas y flores].

2. Show the group the Mystery Plants [Plantas Misteriosas]. Explain that the shoots are inside the bags; only the roots are exposed. Ask the group to make up a descriptive name [nombre descriptivo] for each type of root system [red de raíces].

3. Define the limits [los límites] of the study area and point out any plants that the students should not disturb. Divide the group into teams of two. Challenge each team to: "Find several different plants with root systems like the ones on each of the Mystery Plants. **[Encuentren varias plantas diferentes con raíces como las que tienen las Plantas Misteriosas.]**" Encourage the teams to bring back for comparison all the plants they dig up. Distribute a trowel to each team, and let them dig in.

4. Visit each team, encouraging the youngsters to take the time to get all the roots with the plant. You might want to ask the teams some questions, such as:

a. Which types of roots have the most soil clinging to them?
¿Qué tipos de raíces tienen más tierra pegada?

b. How are your plants' roots like the Mystery Plants' roots?
¿En qué se parecen las raíces de tus plantas a las raíces de las Plantas Misteriosas?

Note: Washing the roots in a bucket of water to remove soil makes closer examination possible.

5. When all the youngsters have washed and compared their roots, have them form a root "line-up [colocación]," grouping those plants with roots similar to Mystery Plant #1 in one place, and those with roots like Mystery Plant #2 in another place. But don't let the mystery plants out of the bags yet!

6. Ask the youngsters to guess the identity of the two Mystery Plants. Can the kids tell what the whole plant looks like when they can only see the roots? **[Traten de adivinar la identidad de las dos plantas misteriosas. ¿Podrían decir cómo es la planta completa viendo unicamente las raíces?]** Let the suspense build as they guess, then uncover the mystery plants. Who was correct?

7. To give the youngsters further experiences with roots and shoots, give each team of two an Action Card [Tarjeta de Acción]. Allow ten minutes for the teams to meet their challenges.

LANGUAGE DEVELOPMENT

GETTING TO THE ROOT OF THE MATTER

1. Were any roots uncovered that were not like those on either Mystery Plant? How were they different?
¿Llegaron a encontrar alguna red de raíces que no se pareciera a ninguna de las dos Plantas Misteriosas? ¿En qué era diferente?

2. How would you explain two plants of the same kind that have roots that are *not* the same?
¿Cómo podrías explicar el caso cuando dos plantas del mismo tipo tienen raíces distintas?

3. Why do you think there are so many different kinds of root systems?
¿Por qué crees que hay tantos tipos de redes de raíces?

4. Did you find any animals near the roots of the plants? What do you think the animals were doing there?
¿Se encontraron animalitos cerca de las raíces de las plantas? ¿Qué crees que estaban haciendo ahí?

5. How do animals, including man, use plant roots? Have you ever eaten a root?
¿Cómo son usadas las raíces por los animales, incluyendo el hombre? ¿Alguna vez has comido raíces?

6. What kind of root would you design for dry soil? Sandy soil? Wet soil? Hard soil? No soil?
¿Qué tipo de raíz diseñarías tú para un terreno seco? ¿Un terreno arenoso? ¿Terreno húmedo? ¿Terreno duro? ¿Para cuando no hay tierra?

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WORDS HAVE ROOTS TOO

LAS PALABRAS TAMBIÉN TIENEN RAÍCES

This is a game that introduces youngsters to root words, prefixes, and suffixes. A *root* word is the basic word (reach) to which a *prefix* (un-) and/or a *suffix* (-able) can be added to change the word's meaning. **[La *raíz* de la palabra, es la parte básica (por ejemplo, pegar) a la que se le pone un *prefijo* (des-) o un *sufijo* (-able) para alterar el significado de la palabra.]** Prefixes come *before* the root and suffixes *follow* the root. **[Los prefijos son los que van *antes* de la raíz y los sufijos son los que van *después de la raíz*.]** Thus by adding a prefix and suffix to the root word *reach*, we get the word *unreachable*. **[Si se añade un prefijo y un sufijo a la raíz *pegar* se obtiene la palabra *despegable*.]**

THE ROOT GAME

1. Write the word *returnable* on the data board like this: re-TURN-able. Tell the youngsters: "This is the word *returnable*, and it has a root." Tell the kids that the *root* of a word is its main part, and its meaning can be changed by adding prefixes (re-) and/or suffixes (-able). *Turn* is the root word in *returnable*. Turn means "rotate", *re-* means "again", and *-able* means "able to." So, *returnable* means "able to rotate again."

The Spanish word *removedor* (remove) can be developed in the same manner. **[Esta palabra removedor tiene una raíz. La raíz de la palabra es la parte principal a la que se le puede cambiar el significado añadiendo prefijos (re-) y sufijos (-dor). *Mover* es la raíz de *removedor*. El prefijo *re-* significa "otra vez", *mover* significa "cambiar o quitar" y *-dor* significa "el que lo hace". Entonces, *removedor* es "el que lo quita otra vez".]**

2. Show the youngsters the list of roots words, prefixes, and suffixes. Pick an example from the list of root words, and a prefix from the list to make a new word. Then let the students take turns challenging each other in this way:
   a. One student picks a root word from the list, and says, "*Place* is the root word. Augie, can you change it?"
   b. Augie picks a prefix or a suffix and says, "I choose the prefix *re-* and make the word replace."
   c. Augie then picks a new root word and challenges another student to change it. Let everyone have a turn.

Keep a list of the words the kids make. Note: Be sure to encourage each youngster to use the words, *root, prefix,* and *suffix* so that they will become familiar with these new words.

MINI-DICTIONARY

root or
raíz: la parte de la planta que se encuentra en el interior de la tierra; absorbe agua y minerales y sostiene la planta en la tierra.

shoot or
tallo: la parte de la planta que está por encima de la tierra y que *sostiene* a las ramas, las hojas y las flores.

environmental conditions or
condiciones ambientales: las cosas físicas y las condiciones climatológicas que rodean y afectan a los organismos en una región.

A Component of the California Plan for the Education of Migrant Children
E.S.E.A., Title 1, P.L. 93-380

After walking through a field or a meadow, have you ever stopped to snatch off burrs or foxtails that were sticking to your socks? Although you may not have realized it at the time, you were an agent of seed dispersal.

Seed dispersal is dependent on a plant ***adaptation*** [***adaptación***] that allows for the dispersing of seeds from the parent plant to a more favorable growing site. The adaptation that allows a seed to be dispersed (e.g. the stickiness of a burr that enables it to catch on fur, the light weight of a cotton seed enabling it to fly in the wind) is the plant's ***seed-dispersal mechanism*** [***mecanismo de dispersión de semillas***].

Are seed-dispersal mechanisms important? You bet! A seed sprouting directly underneath a parent plant may have difficulty surviving. Older plants often limit the amount of sunlight and other raw materials available to young plants growing under them, making it impossible for young plants to survive in that location. Thus a seed-dispersal mechanism, to many plants, is a crucial feature that enables the species [especies] to continue.

OVERVIEW

The youngsters investigate plant adaptations that allow for the dispersing of seeds. The Action Cards challenge the youngsters to modify the seeds so that they may be dispersed in various ways.

CHALLENGE: MODIFY DRIED BEANS OR PEAS SO THAT THEY MAY BE DISPERSED BY VARIOUS NATURAL FORCES.

RETO: ADAPTA SEMILLAS DE FRIJOL O DE CHÍCHARO DE MANERA QUE PUEDAN SER DISPERSADAS POR VARIAS DE LAS FUERZAS NATURALES.

MATERIALS

For each youngster:

1 copy of an Action Card [Tarjeta de Acción]
1 copy of a Seed-Go Card [tarjeta de Bingo de Semillas]

For the group:

1 bag of dried beans or peas (Seeds of any kind will do.)
- balsa wood and/or construction paper
- transparent tape
- paste or glue
- rubber bands
- toothpicks
- scissors
- pencils
- red tempera*
- balloons*
- plastic bags*
- pieces of cork*
- cotton and/or feathers*
- small metal springs*

1 data board [cartel]
(See the *OBIS Toolbox* folio.)
1 marking pen

*Optional materials

ACTION

1. Tell the group not *all* seeds can grow where they fall, and that some seeds are dispersed (carried, blown, or pushed away). [**No *todas* las semillas pueden desarrollarse en el lugar donde caen, por lo que algunas semillas son dispersadas (o sea transportadas, arrastradas por el viento o empujadas por algo).**] Explain the concept of ***seed-dispersal mechanism*** [***mecanismo de dispersión de semillas***]. (See the background section.) Ask the youngsters to think of ways [maneras] that seeds are adapted for dispersal (for example, burrs that stick on dogs, cotton seeds that blow in the wind, etc.).

2. Give each youngster an Action Card and a bean seed. Challenge the youngsters to modify their bean seeds for the type of dispersal specified on their Action Cards [**modifiquen su semilla para el tipo de dispersión que se indica en las Tarjetas de Acción**].

SEED DISPERSAL
Action Card

Adapt your seed to attract a bird or other animal.

Hint: bright, tasty fruits with seeds inside.

SEED DISPERSAL
Action Card

Adapt your seed to hitchhike on an animal or man for twenty feet.

SEED DISPERSAL
Action Card

Adapt your seed to float on water at least five minutes.

Hint: air bubble, raft.

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SEED DISPERSAL
Action Card

Adapt your seed with a mechanism that will throw the seed two feet away from the parent plant.

Hint: burst, split.

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DISPERSIÓN DE SEMILLAS
Tarjeta de Acción

Modifica tu semilla para que pueda flotar en el agua por lo menos cinco minutos. *Consejo:* una burbuja de aire, una balsa.

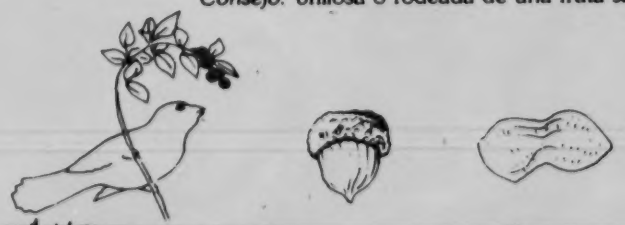
DISPERSIÓN DE SEMILLAS
Tarjeta de Acción

Modifca tu semilla para que tenga un mecanismo que la aviente a un metro de distancia de la planta originaria.
Consejo: envuelta en algo que se reviente o parta.

DISPERSIÓN DE SEMILLAS
Tarjeta de Acción

Modifica tu semilla de manera que atraiga a un pájaro u otro animal.

Consejo: brillosa o rodeada de una fruta sabrosa.



DISPERSIÓN DE SEMILLAS
Tarjeta de Acción

Modifica tu semilla para que pueda prenderse y transportarse en un animal o en una persona por siete metros.

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SEED DISPERSAL
Action Card

SEED DISPERSAL
Action Card

SEED DISPERSAL
Action Card

Adapt your seed to fly at least three feet.

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SEED DISPERSAL
Action Card

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DISPERSIÓN DE SEMILLAS
Tarjeta de Acción

Modifica tu semilla para que pueda volar cuando menos un metro.

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DISPERSIÓN DE SEMILLAS
Tarjeta de Acción

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DISPERSIÓN DE SEMILLAS
Tarjeta de Acción

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3. **Action Cards [Tarjetas de Acción].**

☐ Modify your seed to float on water for at least five minutes.
Hint: air bubble, raft.
Modifica tu semilla para que pueda flotar en el agua por lo menos cinco minutos.
***Consejo:* en una burbuja de aire, en una balsa.**

☐ Modify your seed with a mechanism that will throw the seed one meter away from the parent plant.
Hint: burst, split.
Modifica tu semilla para que tenga un mecanismo que la aviente a un metro de distancia de la planta originaria.
***Consejo:* envuelta en algo que se reviente o parta.**

☐ Modify your seed to attract a bird or other animal.
Hint: bright, tasty fruits with seeds inside.
Modifica tu semilla de manera que atraiga a un pájaro u otro animal.
***Consejo:* brillosa o rodeada de una fruta sabrosa.**

☐ Modify your seed to hitchhike on an animal or a man for seven meters.
Modifica tu semilla para que pueda prenderse y transportarse en un animal o en una persona por siete metros.

☐ Modify your seed to fly at least one meter.
Modifica tu semilla para que pueda volar cuando menos un metro.

Blank cards may be used to add other adaptations you or the youngsters think seeds have.

4. Provide the group with materials for modifying their seeds. Let the construction begin.

3. Seed-Go is played like Bingo. Each youngster must decide how the seeds he found are dispersed. He then glues or tapes the seeds in the proper boxes on his card. (Some seeds may be dispersed in more than one way.) The first person with five seeds in a row in any direction wins. [**En el juego del Bingo de Semillas, cada uno debe determinar el modo en que cada una de las semillas que encontró es dispersada. Después de eso, deben pegar la semilla en el cuadro con el modo de dispersión correspondiente. (Algunas semillas pueden ser dispersadas de varios modos.) La primera persona con cinco semillas seguidas en cualquier dirección, gana.**]

4. When someone says he has won, encourage questions from the others so that the winner can explain his reasoning. [**Explica como lograste ganar.**]

5. When everyone is finished, call upon each of the youngsters to read their cards to the group and demonstrate their dispersal inventions. [**Lee tu Tarjeta de Acción y demuestra el invento que hiciste para la dispersión de la semilla.**] You may have to provide a bucket of water for testing floating seeds if a pond or stream is not available.

6. Post the group's modified seeds on a data board. Have the group invent descriptive names for the modified seeds, e.g. "The Floater" or "The Slingshot." [**Inventa nombres descriptivos como "El Flotador" o "La Resortera".**] Then label each seed on the data board with its name, and display the data board in the camp's OBIS Center [el Centro OBIS del campamento].

SEED-GO GAME

JUEGO DE "BINGO DE SEMILLAS"

1. Have the group collect as many different kinds of seeds as they can find in the study site (e.g. seeds of grass, trees, bushes, weeds, garden plants [por ejemplo, semillas de pasto, de árboles, arbustos, hierbas, o plantas del jardín]).

2. Give each child a copy of the Seed-Go Card [tarjeta del "Bingo de Semillas"] and put some glue or tape out.

LANGUAGE DEVELOPMENT

WHAT DO YOU THINK?

1. Can you find plants that actually have features like the seed-dispersal mechanism you constructed?
¿Podrías encontrar plantas con un mecanismo de dispersión de semillas como el que tú fabricaste?

2. What might happen if seed-dispersal mechanisms did not exist?
¿Qué pasaría si los mecanismos de dispersión de semillas no existieran?

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SEEDY DRAMA

LAS SEMILLAS ACTÚAN

1. Each youngster chooses a plant that he would like to be [representar].

2. In turn, each youngster acts out the seed-dispersal mechanisms that he thinks his chosen plant has. **[Trata de actuar como el mecanismo de semillas de la planta que escogiste.]**

3. The audience (other group members) tries to figure out what kind of seed-dispersal mechanism he is demonstrating and what force carries the seed (wind, water, animals). **[El resto del grupo traten de adivinar qué tipo de mecanismo está siendo representado y qué fuerza mueve a la semilla (ya sea viento, agua, animales, etc.)]**

4. The audience may also want to guess the plant that will grow from this dramatized seed.

DOUBLE PLAY
DOBLE FUNCIÓN

Stage a mini-drama with each youngster acting out a different part of a plant's growth process. Youngsters could take the parts that seeds, dispersal mechanisms, air, water, minerals, and sun play in the development of plants. Have each member describe his or her imaginary role in the development of plants. **[Vamos a poner en escena una mini-obra teatral acerca del crecimiento y desarrollo de una planta. Cada niño va a representar el papel que tienen ya sea la semilla, el aire, los minerales, el agua, el sol o el mecanismo de dispersión y describir su papel imaginario en el desarrollo de la planta.]**

MINI-DICTIONARY

adaptation or
adaptación: cualquier característica especial de un organismo que le aumenta las posibilidades de supervivencia y reproducción.

seed-dispersal mechanism or
mecanismo de dispersión de semillas: la adaptación que tiene una planta que le permite dispersar sus semillas hacia otros lugares más favorables para su germinación.

A Component of the California Plan for the Education of Migrant Children
E.S.E.A., Title 1, P.L. 93-380

A mountain lion slowly and quietly approaches a deer until it is within pouncing distance. A wading bird, such as an egret or a heron, stealthily pursues frogs and fish until a sudden thrust of the bird's sharp bill can reach the prey. Many predators must stalk their prey to get close enough to strike without warning. The prey must remain constantly on the alert for possible dangers. A good sense of hearing and the ability to pinpoint the direction from which sound comes are important adaptations for survival.

CHALLENGE: SURVIVE AS A PREDATOR OR A PREY BY EITHER SILENTLY STALKING AND "CATCHING" YOUR PREY OR BY DETECTING AND STOPPING APPROACHING PREDATORS.

RETO: SOBREVIVE COMO ANIMAL RAPAZ O PRESA YA SEA ACECHANDO SILENCIOSAMENTE Y "ATRAPANDO" A TU PRESA, O DETECTANDO Y DETENIENDO A LOS ANIMALES RAPACES QUE SE APROXIMAN.

OVERVIEW

In this activity the participants play the parts of ***predators*** and ***prey* [*animales rapaces* y *presas*].** "Predators" must learn to move silently to "catch" the "prey." The prey must rely totally on their sense of hearing to detect and stop the approaching predators.

MATERIALS

For day use:

1 blindfold [venda de ojos] for each group
- cotton for ear plugs

1 roll of masking tape
- several marking pens

20 index cards (3" x 5")

For night use, add:

1 flashlight [linterna] with fresh batteries
1 paper cone (See "Preparation" section.)

PREPARATION

Silent Stalking [Cazando al Acecho] works best with no more than ten players. The game may be played during the day or night, but night games are more exciting.

Site. Choose a fairly open, level site (such as a lawn, forest clearing, or field) at least 20 meters across. Dry leaves and other plant litter make the best surfaces for this game.

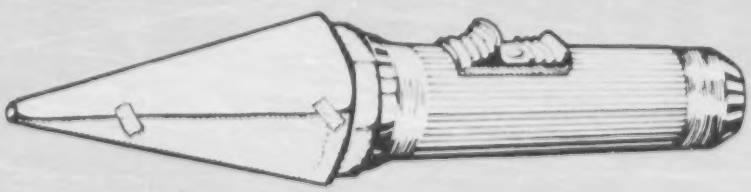
Flashlights and Paper Cones. A narrow flashlight beam is required for clear identification of hits or misses. Use stiff paper to make a paper cone for narrowing the light beam. Take a piece of paper about the size of an OBIS equipment card and roll it into a cone 15- to 30-cm long. The larger opening should fit tightly over the head of the flashlight. Tape the cone to hold it together, and tape the cone on the flashlight in such a way that you obtain the narrowest spotting beam. Carrying an extra set of batteries is recommended.

Message Cards [Tarjetas de Mensajes]. Prepare the message cards for the broken-telephone language game. Write a different message on each of a dozen or more index cards. Keep the messages simple, and relate them to the stalking. Some examples:

- ☐ **Tres niños persiguen un perro.** (Three boys chased a dog.)
- ☐ **Cinco ranas trataron de atrapar cinco moscas.** (Five frogs tried to catch five flies.)
- ☐ **Las panteras cazan al *acecho*.** (Panthers stalk silently.)
- ☐ **Un niño pescó un pez gato.** (A youngster fished for catfish.)
- ☐ **Un conejo saltó para escaparse de un tecolote.** (The rabbit jumped away from the owl.)

ACTION

Introduce *Silent Stalking [Cazando al Acecho]* as a predator/prey game. Explain the terms ***predator* [*animal rapaz* o *depredador*]** and ***prey* [*presa*]** if these terms are new to the group. A ***predator*** is an animal that takes living plants or animals for food. A ***prey*** is a living plant or animal that is eaten by an animal. Ask the group for examples of predators and their prey. (Cats and mice, birds and insects, trout and worms, snakes and frogs [gatos y ratones, pájaros e insectos, truchas y gusanos, víboras y ranas]).



THE SILENT STALKING GAME

Outline the game rules to the participants.

1. One member of the group is the prey; the other members are predators.
Un niño va a ser la presa, los demás, los animales rapaces.

2. The prey stands in the center of the noisy walking site and puts on the blindfold. (Ears should remain uncovered.) At night, the prey also has a flashlight.
La presa se debe parar en el centro del área y ponerse una venda en los ojos. Cuando se juega de noche, ésta usará una linterna de baterías para apuntar.

3. The predators assemble in a circle around the prey (5 to 8 meters from the prey).
Los animales rapaces deberán formar un círculo alrededor de la presa.

4. When everyone is ready, the blindfolded prey starts turning around while the predators walk in a circle around the turning prey. After spinning about four times, the prey yells "STOP!" Everyone, including the prey, stops.
Ya que todos estén listos, la presa empieza a girar mientras que los animales rapaces caminan en círculo, alrededor. Después de cuatro vueltas, la presa grita "¡BASTA!" y todos se paran.

5. Now the predators silently stalk the prey. The prey protects herself by listening for the sound of approaching predators and pinpointing them (pointing at them with either the flashlight beam or a finger) before they can get close enough to tag her. The predators must pause between each step to see if the prey has pinpointed them. This prevents a predator who has been pinpointed from running up and tagging the prey.
Enseguida los rapaces empiezan a acechar y la presa está atenta a escuchar los ruidos que hacen al acercarse, para apuntarlos antes de que lleguen a tocarla. Los animales deben esperarse un momento después de dar cada paso para ver si la presa los está apuntando.

6. A referee (you or a youngster) judges the prey's pointing accuracy. When the prey points, the referee yells "Freeze!" and everyone stops. The referee moves behind the prey, sights along the prey's pointing arm, and announces "hit" or "miss." A "hit" occurs when the prey's flashlight beam or finger points directly at or above an approaching predator. (*Direction* is important here, not height of guess.) "Hit" predators must remain "frozen" for the remainder of the game. When a predator tags the prey, the referee also yells "Freeze!" and everyone stops while the successful predator moves outside of the circle. The stalking resumes when the referee yells "STALK!"
El árbitro decide si la presa le atinó al apuntar. Cuando la presa apunta, el árbitro grita "¡ALTO!" y todos se paran. El árbitro se coloca atrás para confirmar si la presa al apuntar le "acertó" o le "falló". Los animales que fueron apuntados y se les "acertó", deben permanecer "congelados" por el resto del juego. Cuando un rapaz toca a la presa, el árbitro grita "¡ALTO!" y todos se paran hasta que el rapaz se sale del círculo. El juego continúa cuando el árbitro grita: "¡A ACECHAR DE NUEVO!"

7. The game ends when all the predators have tagged the prey, all the predators have been eliminated, or when the prey has used up all her chances to point. (Each prey is given twice as many pointing chances as there are predators; i.e., with eight predators the prey gets sixteen chances to point.)
El juego se termina cuando todos los animales rapaces han tocado a la presa o han sido eliminados, o cuando la presa ha usado todas sus oportunidades de apuntar (o defenderse). (Las oportunidades para apuntar de la presa son el doble de rapaces que hay.)

8. **Playing the Game.** When everyone understands the game, point out the stalking circle(s), select the prey, and let the stalking begin. You may want to run through a practice round. Suggest to the players that at the end of each round the predators who have been detected try to figure out what gave them away.
[Los animales rapaces que fueron apuntados pueden tratar de explicar por qué fueron detectados por las presas.]

GAME VARIATIONS

Before playing any of the following variations of the game, ask your group to predict the outcome of the variation. **[Traten de predecir el resultado de esta variación del juego.]**

1. Simulate a hearing loss [sordera] due to injury or age [a una lesión o a la vejez] by placing ear plugs or cotton in one or both of the prey's ears.

2. Play the game on several different walking surfaces: a quiet one, a noisy one, a slope.

3. Ask the predators and prey to get down on their hands and feet [ponerse a gatas] to simulate four-legged animals.

4. Play the game on a windy (noisy [ruidosa]) night.

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5. Challenge the youngsters to see how close they can get to a bird, cat, fish, butterfly, squirrel, or lizard [pájaro, gato, pez, mariposa, ardilla, o lagartija]. At night they could stalk night crawlers (worms), owls, frogs, or raccoons [gusanos, lechuzas, ranas, y mapaches].

LANGUAGE DEVELOPMENT

TALKING STALKING

1. Ask the participants how they would change their bodies in order to be more effective as predators or as prey.
¿Cómo cambiarían sus cuerpos para hacerlos más efectivos como depredadores, o como presas?

2. Ask the most successful stalkers to explain their silent stalking skills to the rest of the group.
Los mejores cazadores expliquen al grupo qué técnica de acecho usaron.

3. Let the youngsters who were "prey" explain how it felt to be stalked.
Los niños que fueron presas, platiquen qué se sintió ser acechado por enemigos.

BROKEN-TELEPHONE GAME

Ask the youngsters to sit in a circle. Tell them that they are going to pass a message around the circle. The game is played like this:

1. One youngster selects a message card. (See the "Preparation" section.)
Un niño escoge una Tarjeta de Mensaje.

2. This first youngster whispers this message in the ear of the person on her left. That person whispers the message to the next person, and so on until it reaches the last person.
El primer niño dice el mensaje (en voz baja al oído) a la persona que está a su izquierda. Esa persona, a su vez, dice el mensaje secreto a la persona que sigue y así hasta que haya sido pasado a la última.

3. The last person then repeats *out loud* the message she received. The person who *started* the message then reads the card and the group compares the beginning and ending messages. **La última persona dice en *voz alta* el mensaje que recibió. La persona que *empezó* lee la tarjeta con el recado original, así el grupo puede comparar ambos.**

4. If the group enjoys the game, give each youngster a chance to draw a card, read the message, and pass the message around the circle.

MINI-DICTIONARY

predator or
animal rapaz, animal de rapiña o depredador: el que captura animales o plantas vivientes para su alimentación.

prey or
presa: cualquier animal o planta viviente que es devorado como alimento.

to stalk or
acechar: perseguir o acercarse cautelosamente.

stalking or
acecho: acechanza, espionaje, aproximación cautelosa.

A Component of the California Plan for the Education of Migrant Children
E.S.E.A., Title 1, P.L. 93-380

Most animals make sounds that are distinctive and unique to them. Through these sounds, animals ***communicate*** **[*comunican*]** a variety of messages not only to members of their own kind, but also to other kinds of animals. For example, a cricket chirps, a frog croaks, a snake hisses, a crow caws, and a wolf howls. The frog's croak and the cricket's chirp are male mating calls, which attract females of their kinds and warn male rivals. The crow's caw is often a warning alarm [señal de alarma] evoked by the sight of a ***predator*** **[*animal rapaz*]**.

The snake's hiss warns possible predators to stay away. The wolf's howl may signal to the pack that ***prey*** **[*presa*]** has been found or may greet other members of its family.

The sense of hearing [el sentido del oído] is very important to animals, especially to those with poor vision, animals that are active at night, and animals living in dense forests or in other dark habitats. A keen sense of hearing is an animal ***adaptation*** **[*adaptación*]** that helps to protect them by making them aware not only of the presence of other animals, but also of the reactions of those animals. Animals communicate by both making and hearing sounds.

CHALLENGE: PLAY THE ROLE OF AN ANIMAL. AND FIND YOUR SECRET PARTNER BEFORE A PREDATOR FINDS YOU.

RETO: JUEGA A SER UN ANIMAL Y ENCUENTRA A TU PAREJA SECRETA ANTES DE QUE EL ANIMAL RAPAZ TE ATRAPE.

OVERVIEW

In this activity, a game introduces the concept of ***animal communication*** [***comunicación animal***] through sound. The youngsters play the roles of animals and try to find their secret partners using only sound signals and their sense of hearing. They can play the game at night or during daylight hours. After the *Sound Off!* game [el juego *Haciendo Sonidos*] is over, the youngsters listen for the signals of real animals.

MATERIALS

For the group:
1 ball of string
1 cardboard box
1 pencil
1 data board
1 marking pen
2 each of several different kinds of noise makers: whistles, horns, rattles (milk cartons with a rock inside), aluminum cans [artefactos de sonido de varios tipos diferentes: como silbatos, cometas, sonajas (envases de cartón de leche con piedras adentro), latas de aluminio, etc.] Have on hand extra noise makers for rule changes.
- several pieces of paper (for assignment of predator roles)

Alternative noise makers [Maneras alternativas de hacer ruido]:
- hand clapping, finger snapping, whistling, etc. [aplaudir, castañear los dedos, chiflar, etc.] (If you use these processes, write each signal on two slips of paper and put them into the box.)

For daylight activity only:
1 brown paper bag [bolsa de papel] for each youngster (head size)
2-3 pairs of scissors
2-3 pencils

PREPARATION

1. *Sound Off!* requires a minimum of ten participants but works better wih twenty.

2. **For a daytime activity.** *Sound Off!* is a good game for a dark, moonless night. If you decide to play the game during the daylight hours however, you will need to provide bags for masks. The masks should allow the youngsters to see only straight down to their feet. Make a sample mask to fit over the head, and cut out ear holes.

3. Choose an activity site with no dangerous slopes or tricky obstacles. The area should be large (approximately 40 m x 40 m).

4. Tie a piece of string (30-cm long) to each noise maker and one predator [animal rapaz] sign (piece of paper marked "predator"). Start out with just one predator.

5. To make the noise-maker selection fair to all players, place all items, with their strings attached, into the box so that the strings hang over the edge of the box. (The youngsters will draw their noise makers without looking in the box.)

SOUND OFF!

ACTION

1. Call the youngsters around and tell them: "Some animals, like frogs, communicate with each other by making sounds. Today (tonight) we will play the roles of some animals and try to communicate with another animal of the same kind. **[Algunos animales, como las ranas, se comunican entre ellos haciendo sonidos. Hoy (o esta noche) vamos a jugar a ser animales que estamos tratando de comunicarnos con algún otro animal de nuestra misma especie.]"**

2. Show them the sound makers. Explain that there are two sound makers of each kind, and everyone will get *one*. When the game starts, everyone will try to find "the other animal of their kind" (the other person making the same sound) using *only* their sound makers to guide them. **[Cuando el juego comience, busca "al otro animal de tu misma especie" (o sea el otro niño haciendo el mismo ruido). Usando *únicamente* el sonido de tu artefacto para guiarte.]**

3. **For daytime activity.** Bring out the sample bag mask. Tell the kids: "To make sure that we use *only* our ears to find our partners, we will all wear masks like this. **[Para asegurarnos que usemos únicamente nuestros oídos para encontrar a nuestras parejas, vamos a usar una máscara como ésta]"** Take a few minutes and let each youngster make a mask. (If the bag masks are already made, just distribute them.)

4. Announce one other game rule: "There will also be a predator. **[También tendremos un animal rapaz.]"** When the sound makers are handed out, one youngster will get the predator card. Explain that the predator will be trying to capture (tag) [capturar (tocar)] the others while they are trying to find their partner. When an "animal" is tagged, that youngster moves to the "captured" area and watches the rest of the game. Designate the area that will be the "captured" area [lugar "para los capturados"].

5. When two kids making the same sound find each other, they are "safe [a salvo]" and should take off their masks and stand together silently and watch the rest of the game.

6. A few more rules [reglas]:
   a. Everyone can move freely, but no running is allowed!
      ¡Pueden moverse en libertad, pero no deben correr!
   b. They can "sound off" only when standing still, not while moving.
      Pueden hacer sonidos únicamente cuando estén parados, no moviéndose.
   c. No peeking!
      ¡No se vale mirar por agujeros en la máscara!

7. With their masks on, let each youngster grab a string, thus selecting his or her sound maker, or being designated as the predator. Spread the kids widely over the game area and challenge them to "Find your secret partner before the predator captures you. OK, SOUND OFF! **[Encuentren a su pareja secreta antes de que el animal rapaz los capture. Bueno, una, dos, tres: ¡A HACER SONIDOS!]"**

8. The game is over when everyone is either captured or has found their secret partner.

9. Play again. Let the kids change the rules if they want to. Or, you can suggest that:
   a. The game be played with more predators: two or three.
   b. The predator has to make noise while he moves (perhaps a bell on his foot).
   c. The "animals" make animal calls [imitaciones de sonidos de animales verdaderos] (hoot like an owl or moo like a cow, etc.) instead of using sound makers.
   d. A time limit [tiempo límite] for the game is set (perhaps one-minute or three-minute time limits).

HACIENDO SONIDOS

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LANGUAGE DEVELOPMENT

SOUNDING OFF

1. Which sound makers worked best for attracting and finding partners? Why?
¿Qué artefactos de sonido fueron mejores para poder atraer y encontrar a las parejas? ¿Por qué?

2. Besides attracting a partner, what other signals could animals be giving to each other with sounds that they make?
Aparte de atraer a una pareja ¿Qué otros mensajes pueden enviar los animales en la vida real con los sonidos que hacen?

3. Not all animals make sounds. Can you think of some that don't? How do you think they communicate with each other?
No todos los animales producen sonidos. ¿Puedes nombrar un animal que no produzca sonido? ¿Cómo crees que se comunica con los otros animales?

SOUND ACTIVITIES

1. **Match game [haciendo juego].** Bring out a data board and marking pen. Ask each youngster, in turn, to think of an animal and *the sound* that it makes [nombra un animal y haz *el sonido* que éste hace.] For example, cow . . . moo, snake . . . ssss, etc. Write down as many animals and their sounds as the youngsters can think of.

2. **Sound relay [cadena de sonidos].** Let one youngster name an animal (cat) and then call on another youngster. The second youngster then imitates the sound [imita el sonido] that this animal makes. If he is right, he then calls out the name of another animal (owl) and asks another youngster to imitate this second animal's sound. And so on. Make sure each youngster is included.

3. Have the youngsters listen for sounds made by real animals [animales verdaderos]. Ask the youngsters what they think the animals are communicating.

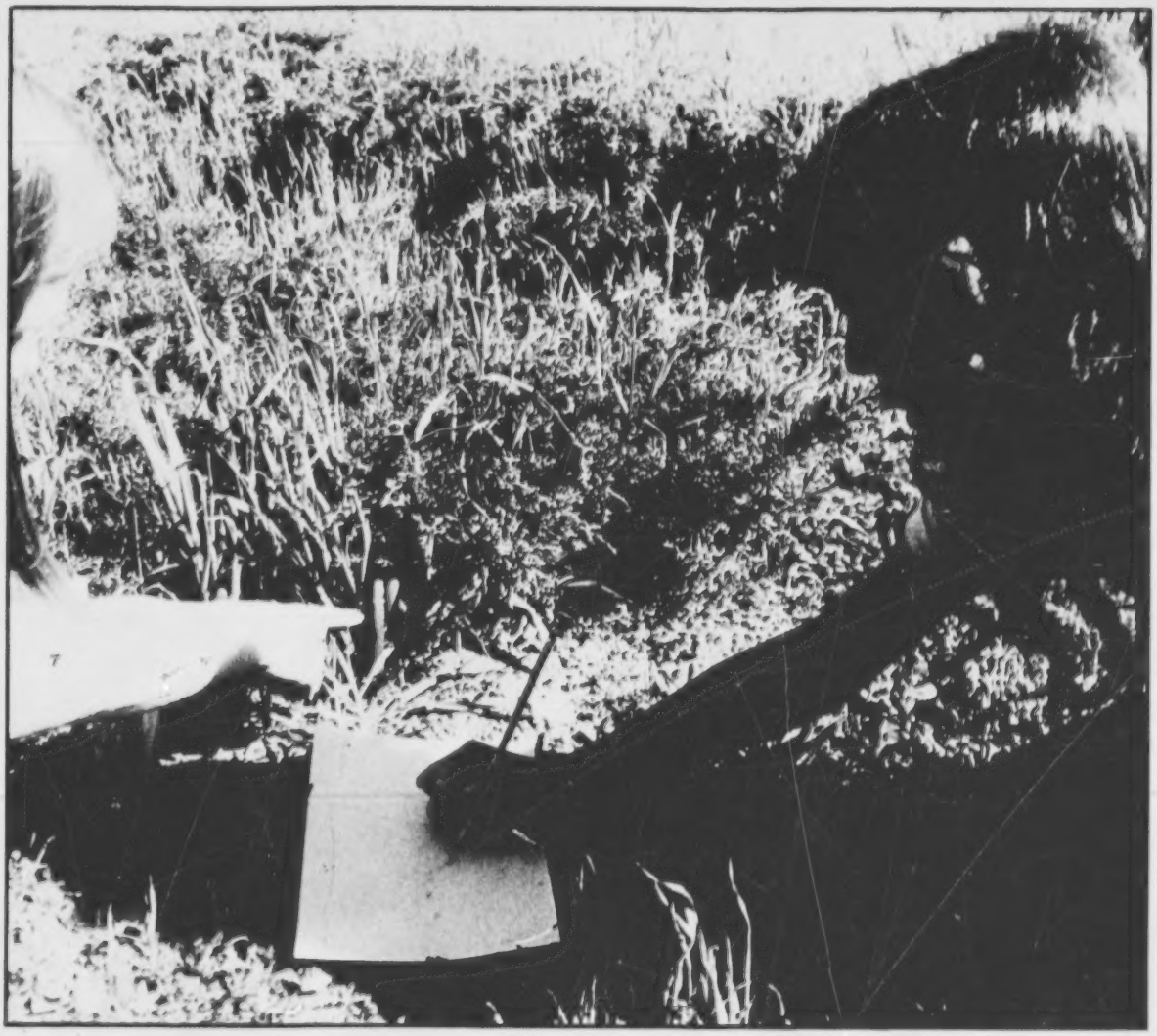
MINI-DICTIONARY

animal communication or
comunicación animal: la manera en que los animales intercambian información mensajes, etc.

predator or
animal rapaz: el animal que captura animales y plantas vivientes para su alimentación.

prey or
presa: cualquier animal o planta viviente que es capturada como alimento.

adaptation or
adaptación: cualquier característica especial de la planta o del animal que le aumenta las posibilidades de supervivencia y reproducción.



Every plant and animal lives some place. Different kinds of ***organisms*** **[*organismos*]** (plants and animals) live in different types of places. Grasshoppers live in grassy fields, frogs live in ponds, and ground squirrels live in the ground. The place where an organism lives is called its ***habitat*** **[*medio*]**. If you were looking for a frog, you would look in a pond habitat.

The way organisms of the same kind are spread out is called their ***distribution***

[*distribución*]. There are three basic kinds of distribution:

The corn plants in a field display a *uniform* distribution [distribución *uniforme*], the thistles in a pasture are *randomly* distributed [distribuidos *al azar*], and blackbirds are often seen in a clumped distribution (flock) [distribución *agrupada*] at roadsides or on wires.

OVERVIEW

The use of "sticklers [palillines]" as a study organism is a good way to introduce your youngsters to the concepts of ***habitat*** [***medio***] and ***distribution*** [***distribución***]. Sticklers can be toothpicks, popsicle sticks, beans, or popcorn (anything small and biodegradeable) that you make into "organisms" for the sake of the activity. You select a site, pick a habitat (under rocks or sticks, for example), choose a distribution (e.g. clumped), and hide your sticklers. Then the youngsters search for the sticklers to discover their habitat and distribution. Following the stickler simulation, the youngsters should be able to discuss the habitats and distributions of *real* plants and animals in your area.

CHALLENGE: FIND OUT EVERYTHING YOU CAN ABOUT THE STICKLERS LIVING IN YOUR AREA.

RETO: DESCUBRE LOS PALILLINES QUE HAY EN EL ÁREA Y AVERIGUA LO QUE PUEDAS ACERCA DE ELLOS.

MATERIALS

For each participant:

1 data card (cardboard square 20 cm by 20 cm covered with black paper) or a large index card [tarjeta de ficha]
1 pencil

For the group:

1 box of flat toothpicks, popsicle sticks, seeds, or other similar materials [palillos de dientes, palitos de paleta helada, frijoles, o cualquier otro material apropiado]
1 large data board (See the *OBIS Toolbox* folio.)
1 marking pen
1 bag for collecting sticklers

PREPARATION

Before the activity, look over the site you plan to use. What habitats are available? Around clumps of grass or weeds? Along the edges of buildings or walls? Under leaves? Choose a habitat (under rocks for example), and decide on a distribution (perhaps random). Then place a stickler (toothpick) under a random selection of the rocks. You may want to hide up to 100 sticklers so that every youngster can find a few. You're ready!

Also, be sure to have a pencil and a small data board or a large index card for each youngster to use for his or her map.

ACTION

1. Go to your stickler site and gather the group around you.

2. Hold up a stickler and say: "Look everyone! This is a stickler and I know *one* thing about it. I know that it lives in this area. **[Escuchen bien todos: este animal se llama palillín y yo sé *una* cosa acerca de él y es que vive en este lugar.]"** Define the boundaries [límites] of the site for the kids at this point.

3. Now tell the youngsters that you want them to help you find out where the sticklers live. In order to find out, they will have to find some more in the area. **[Tenemos que encontrar más "palillines" para aprender más acerca de la manera en que viven.]**

4. **Recording [Tomando notas].** Tell the youngsters that before they start to search, they will need to make a simple map of the stickler area. Every time they find a stickler they should mark on their map *just where they found it.* **[Cada vez que encuentren un palillín, hagan una señal en el mapa, en el *lugar exacto donde lo encontaron.*]** This is important; they will be pooling their data later.

5. Send them out with these instructions:
   a. Make your map. **[Dibujen un mapa del lugar.]**
   b. Find sticklers. *Mark your map* each time you find one. **[*Señalen en el mapa* cada lugar donde encuentren un palillín.]**
   c. Collect the sticklers as you find them. **[Guarden los palillines que encuentren.]**

6. While the youngsters hunt, make a large data board map. After everyone's data are transferred, the youngsters are ready to find out about the ***habitat*** and ***distribution*** of sticklers.

LANGUAGE DEVELOPMENT

TALKING IT OVER

1. Ask the youngsters, "What did you find out about sticklers? **[¿Qué han averiguado acerca de los palillines?]"** Encourage everyone to respond.

2. Write **"*Habitat* is where an organism lives [*medio es donde un organismo vive*]"** on the data board, and give the kids the definition verbally as well. Then ask, "What is the habitat of our animal called stickler? **[¿Cuál es el medio donde viven nuestros animales llamados palillines?]"** Have them describe the habitat as accurately as possible.

3. Then write and say: **"*Distribution* is *how* organisms of any one kind are spread out in their habitat. [*Distribución es el modo en que los organismos de cualquier especie están repartidos en su medio.*]"** Now draw three squares on your board. Make uniformly spaced dots in the first box, and say: "Some organisms are distributed like this. **[Algunos organismos se encuentran distribuidos en su medio de este modo.]"** Ask: "What might we call this kind of distribution? **[¿Cómo podríamos llamar este tipo de distribución?]"** Write down the kids' responses under the square if they are accurate (even, rows, organized) and add "uniform [uniforme]" if they don't mention it. Tell the kids that scientists call this ***uniform distribution* [*distribución uniforme*]**. Develop the terms ***random* [*al azar*]** and ***clumped* [*agrupado*]** in the same way.

4. Ask the kids to use their hunting experience and the information on the large data map to decide what habitat the sticklers live in, and how they are distributed in their site.

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TALKING ABOUT REAL PLANTS AND ANIMALS

Now tell the kids: "Take three minutes to find your favorite plant or animal in the site and bring a sample back to share. **[Tienen tres minutos para encontrar una muestra de un animal o planta que les guste mucho.]**" Go around to each youngster and have her tell you what organism she selected to share, what habitat it lives in, and its distribution. Encourage complete descriptions of habitats, including information about light, temperature, and moisture in the habitat. **[Describe el medio en el que tu organismo vive. ¿Podrías decir algo acerca de la luz, temperatura y humedad que tiene este medio?]**

TALKING IT OVER

Give the youngsters the following challenge: "Describe your habitat at different times of the day: 3:30 a.m., breakfast time, mid-afternoon, after dinner, and the probable distribution a week from now. **[Describan el medio en el que están viviendo en el campamento y traten de nombrar la distribución de los niños en éste a diferentes horas del día: a las tres de la madrugada, a la hora del desayuno, a media tarde, después de la cena y hasta la distribución probable después de una semana.]**" Make the discussion more graphic by using a map. Use a stick to draw a big map of the camp on the ground. Have the kids collect acorns, small rocks, etc., to represent people. Distribute the "people" on the map where they might be at various times.

MINI-DICTIONARY

organism or
organismo: cualquier planta o animal viviente.

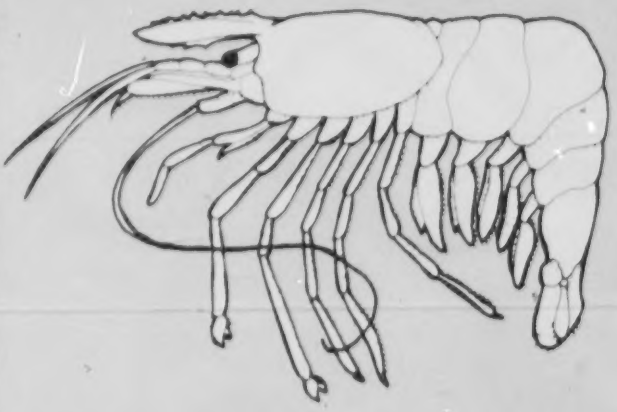
habitat or
medio: el lugar donde vive un organismo.

In any body of water you can usually find a wide variety of plants and animals. Some of the plants we can readily identify as plants, but others that we call scum, moss, and algae look quite different from land plants. Animals also have many different forms and sizes, and can usually be found among the plants.

Youngsters are fascinated by finding these organisms and observing the movement of the animals. Catching animals helps the youngsters learn about the organisms' behavior in water.

OVERVIEW

You can use this activity as an exploratory introduction to the life in aquatic systems: pond, lake, reservoir, stream, or any other body of water. After an investigation of life found in water, the youngsters are introduced to the term ***organism***. An ***organism*** is any living thing: plant or animal. **[Un *organismo* es cualquier planta o animal viviente.]**



CHALLENGE: DISCOVER AND INVESTIGATE SOME OF THE PLANTS AND ANIMALS THAT LIVE IN YOUR AQUATIC STUDY SITE.

RETO: DESCUBRE E INVESTIGA ALGUNAS DE LAS PLANTAS Y ANIMALES QUE VIVEN EN EL AGUA.

MATERIALS

For each team of two:
1 *Pond Guide*
2 dip nets*
2 bug boxes or magnifying lenses*
1 white-bottomed container*
2 team-site boundary markers
1 clear plastic cup*
1 spoon*

*See the "Aquatic Observation Aids" card [tarjeta de "Equipo de ayuda en la observación de la vida acuática"] in the *OBIS Toolbox* folio for the use of these observation aids.

For the group:
1 data board (optional)

PREPARATION

Select a site that provides easy water access and an unobstructed view that allows for easy supervision. Avoid sites with steep or slippery banks. Read the safety section in the *Leader's Survival Kit* folio before conducting the activity.

BRING 'EM BACK ALIVE!
¡QUE REGRESEN SANOS Y SALVOS!

The success of this activity (and of others that deal with living things) springs from the natural curiosity and interest people have for other organisms living around them. Before your group begins this activity, ask for suggestions on how to investigate living organisms without harming them. **[Hagan sugerencias acerca de cómo investigar a los organismos sin dañarlos.]** Use the youngsters' suggestions to emphasize that care should be taken whenever a plant or animal is being studied. Organisms should be retained temporarily for observation purposes, and then returned unharmed to their homes.

ACTION

1. At the aquatic study site, challenge the group to find out what lives in the water. **[Traten de encontrar qué seres viven en el agua.]**

2. Establish a conservation-oriented investigative procedure. (See the "Bring 'Em Back Alive!" section.)

3. Divide your group into buddy teams of two. Tell the teams that buddies *must* stay together so that one buddy can report any problem that his buddy might encounter while working around the water. **[Los "compañeros" *deben* permanecer juntos para que uno de ellos pueda avisar al instructor de cualquier problema que el compañero encontrara mientras trabajan a la orilla del agua.]**

4. Define the overall study-site limits, and distribute the team site markers. Ask each of the teams to mark their study area boundaries and return to the assembly point for their observation aids. **[Cada uno separe y señale una sección del área, y regrese al lugar de reunión para recoger el equipo necesario para la observación.]** Sites should be no longer than 10 meters of waterfront.

5. Reassemble the teams and show them the materials available for use.
   a. Demonstrate the use of the dip nets [redes] and bug boxes (or magnifying lenses) [cajitas de bichos (o lentes de aumento)].
   b. Show the youngsters how to put some water in their white-bottomed containers to make aquariums for holding organisms.
   c. Explain to the youngsters that the *Pond Guide* [*Guía para el Estanque*] is available if they want to find out the name of any plant or animal that they discover in the site.

6. Ask the teams to return to their study areas and use the observation aids to observe and identify as many different kinds of plants and animals as they can. **[Regresen a sus áreas de estudio y usen el equipo de observación. Traten de identificar todos los tipos de animales y plantas que puedan.]** Save ten minutes at the end of the activity for sharing discoveries. One method of sharing consists of the youngsters placing their white-bottomed containers in a circle so that all the participants can see what was found.

LANGUAGE DEVELOPMENT

REVIEWING PLANTS AND ANIMALS

From the youngsters' collections, select three or four kinds of plants [plantas], and ask the youngsters what these living things are called. Point to several animals [animales] and ask what these kinds of living things are called.

The following questions provide opportunities for the youngsters to describe their experiences and "finds."

1. What different plants and animals were found?
¿Qué plantas y qué animales fueron encontrados?

2. What kinds of plants and animals were found most often?
¿Qué clases de plantas y animales fueron las que más se encontraron?

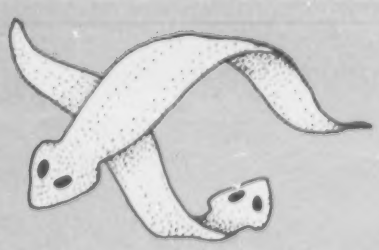
3. What kinds of plants and animals were found least often?
¿Qué clases de plantas y animales fueron las que menos se encontraron?

4. Who found a plant or animal that nobody else found?
¿Acaso alguien encontró alguna planta o animal que nadie más descubrió?

5. Explain how the plants and animals found in the water are different from plants and animals that live on the land.
Expliquen cómo las plantas y los animales que viven en el agua son diferentes a las plantas y animales terrestres.

INTRODUCING THE TERM *ORGANISMS*

Select two or three different plants and as many animals and put all the organisms into one white-bottomed container. Explain to the youngsters that this group is made up of both plants and animals and has a name: ***organisms.*** **[Este conjunto formado de plantas y animales tiene un nombre: *organismos.*]**



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THE "SIMON SAYS" GAME
EL JUEGO DE "FERNANDA MANDA"

This game is designed to improve the children's understanding of the concepts and terms in this activity. Explain to the kids that if you say "Simon says touch a snail," they are to touch a snail. But if you say only "Touch a snail," they are not supposed to touch a snail. **[En el juego si uno dice: "Fernanda Manda toca un caracol", ustedes deben de tocar un caracol. Pero, si uno dice únicamente: "Toca un caracol" se supone que no deben de tocar *nada*.]** Call on *one youngster at a time*, e.g. **"Ramón, Fernanda Manda toca una rana".**

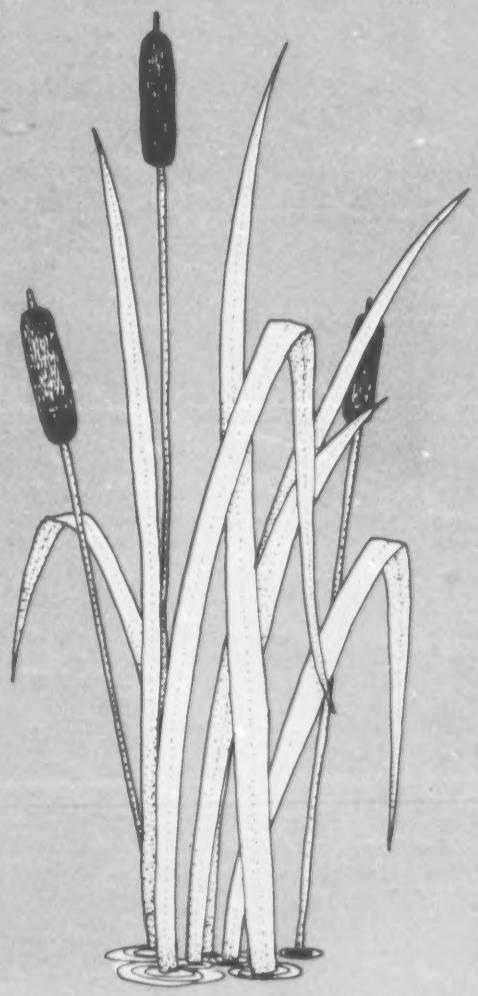
Play several short rounds of the game using several different classes of objects.

a. Touch an *object*. **[Toca un *objeto*.]** (Anything touched is correct.)
b. Touch an *organism*. **[Toca un *organismo*.]** (Any living thing touched is correct.)
c. Touch a *plant*. **[Toca una *planta*.]** (Any living plant is correct.)
d. Touch an *animal*. **[Toca un *animal*.]** (Any living animal is correct.)
e. Touch a ____(specific plant or animal). **[Toca un(a)____(una planta o un animal específico).**

Alternate between using "Simon Says" ["Fernanda Manda"] and omitting the statement. Also alternate the various categories of objects. You will quickly be able to determine which children understand that: (1) Organism means any living plant or animal; (2) Animal can be any living animal-like creature; and (3) Organisms such as moss, backswimmer, frog, and cattails mean only *one* individual organism.

MINI-DICTIONARY

organism or
***organismo*:** cualquier cosa viviente: planta o animal.



A Component of the California Plan for the Education of Migrant Children
E.S.E.A., Title 1, P.L. 93-380

nail polish
VINEGAR
NO MATCH

to maintain a continuing record. The data board relieves youngsters of the burden of pencils and notebooks. Important terms can be viewed easily by all group members, and field observations are conveniently displayed in one place for group consideration.

Making a Data Board* [Preparando un Cartel]

1. Find a piece of thick cardboard, masonite or fiberboard about 80 cm x 60 cm.
2. Cut paper (butcher or other) to the size of the board. Attach the pieces of paper to the board with binder clips or masking tape.
3. Crayons or felt-tip markers are good for recording data because they leave broad marks and come in a variety of colors allowing for easy color coding.

*As an alternative, you can use a large sketch pad.

Comparison of Data [Comparación de Datos]

At some time, you may wish to make comparisons of data collected on different occasions, but at the same activity site. An easy way of doing this is to record the data on plastic overlays on a data-board map of the site. A good source of overlay plastic is inexpensive plastic dropcloth material sold at paint stores and discount variety stores (wax paper also works well). Data can be recorded on one overlay during one investigation, and on others at subsequent investigations. For comparison of data, simply stack up the overlays.

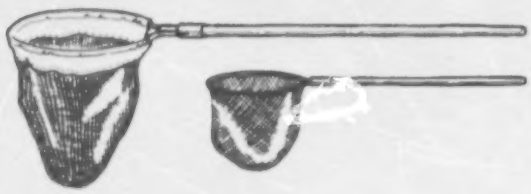
Equipment Card
AQUATIC OBSERVATION AIDS

Bug Boxes

A bug box is a small, clear plastic box with a magnifying lens for a lid. To use the bug box, place an object or organism in the box and replace the lid to magnify the contents. When exposed to direct sunlight a closed bug box heats up rapidly, so release organisms promptly after observing them. The lid can also be used separately as a magnifying lens.

Dip Nets

Nets can either be made or bought. Aquarium nets work fine. You may want to extend the reach of an aquarium net by attaching a dowel, a stick, or a similar extension to the handle. A gradual, gentle scoop of the net is usually more successful and less damaging to organisms than a sudden, violent scooping motion. To prevent eye accidents, ask that the nets never be raised above shoulder level.

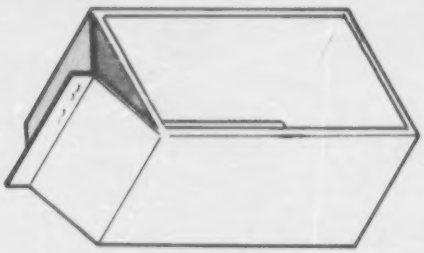


Magnifying Lenses

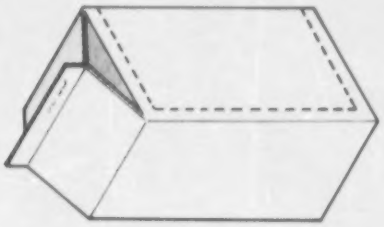
To use a magnifying lens, hold the lens close to one eye and move either your head or the object back and forth until you can see the object clearly.

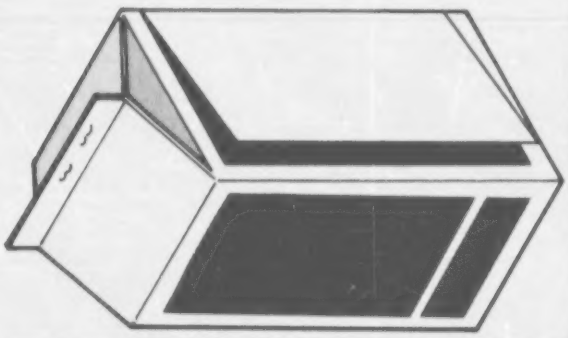
Observation Chambers

Any container that will hold water can serve as an observation chamber. Containers with light-colored bottoms are best for easy viewing of organisms that have been added. Half-gallon milk cartons can be made into deluxe observation chambers. To make one, staple the pouring spout closed and cut out the carton wall on the same side as the stapled pouring spout.



To make a hinged-top observation chamber, just cut along three sides (two short and one long) of the carton wall on the same side as the stapled spout.





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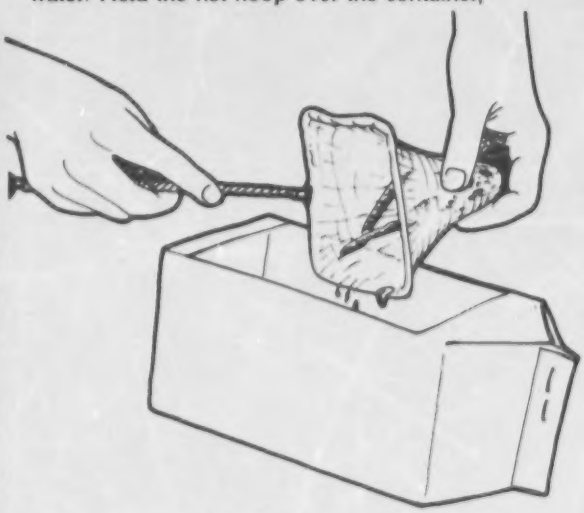
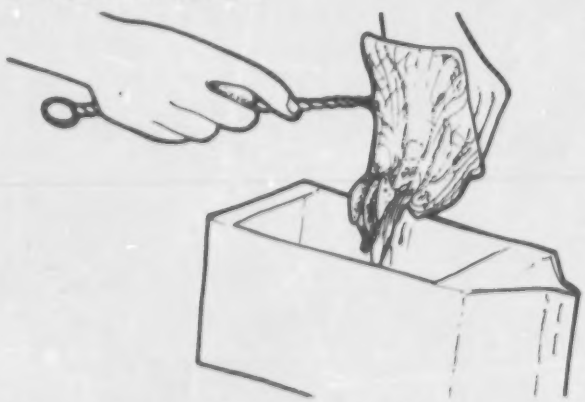
Transferring critters to observation chambers. When using a net to transfer critters, first swish the net through the water without releasing the organisms. (You can use the pond or stream you are investigating.) The rinsing removes any sediment you may have netted. Fill your observation chamber about one-third full of water. Hold the net hoop over the container,



turn the net inside out, and dip the net bag into the water in the container.

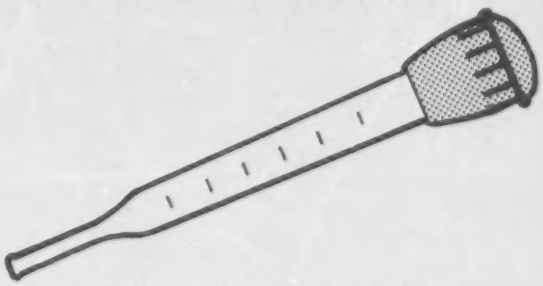


This will release netted organisms into the container.

Spoons and Clear Plastic Cups

Spoons and cups are useful for transporting tiny organisms and observing them at a close range.

Simply dip up tiny organisms with a spoon or cup and place the organisms in a container partially filled with clear water. Turkey basters (giant



dropper type) are also useful for sucking up tiny organisms and transferring them to other containers.

Note: Certain hard-to-get materials are available from the Lawrence Hall of Science. See the order form in the *OBIS Toolbox* folio.

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EQUIPO DE AYUDA
EN LA OBSERVACIÓN DE LA VIDA ACUÁTICA
Tarjeta de Equipo

Cajitas de Bichos

Éstas son unas pequeñas cajas transparentes cuya tapa es al mismo tiempo un lente de aumento. Ahí se colocan los objetos u organismos para ser observados y la tapa aumenta la imagen de éstos. Cuando las cajitas están cerradas y expuestas al sol se calientan rápidamente por lo que hay que soltar a los organismos prontamente después de haberlos observado. La tapa puede usarse por separado como lente de aumento.

Redes para sumergir

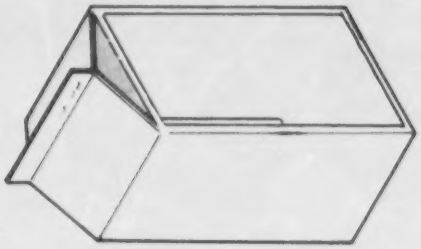
Las redes pueden ser hechas o compradas. Las de acuario trabajan bien y se les puede alargar el mango uniéndoles un palo y así darles mayor alcance. Cuando se extrae algo del agua es mucho mejor hacerlo lentamente para no dañar mucho a los organismos. Se recomienda que las redes nunca se alcen más arriba de la altura de los hombros para evitar accidentes en los ojos.

Lentes de Aumento

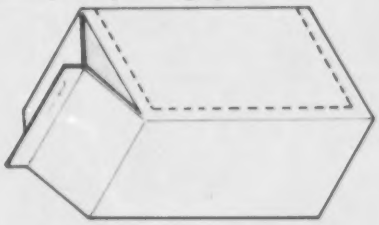
Éstos se ponen cerca de un ojo y la cabeza o el objeto se mueve hacia adelante o hacia atrás hasta que el objeto se pueda ver claramente.

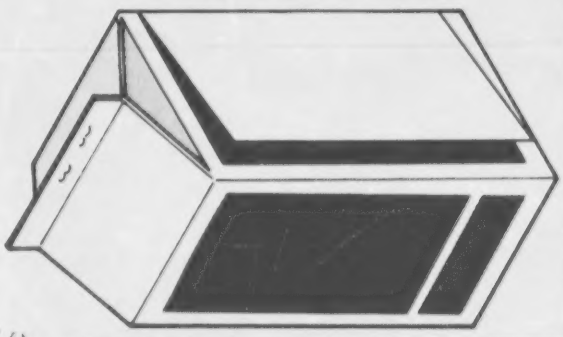
Cámaras de Observación

Cualquier envase o vasija que pueda sostener agua puede servir como cámara de observación. Aquéllos que tienen el fondo de un color claro son mejores para la observación de los organismos que se colocan ahí. Los envases de cartón de leche pueden ser transformados en cámaras "de lujo". Para hacer una, simplemente se cierra el pico (por donde se sirve el líquido), engrapándolo y se corta la pared de cartón que está en el mismo lado que el pico engrapado.



Para hacer una cámara de observación con tapa giratoria, recorte tres lados (dos cortos y uno largo) de la pared del envase que está en el mismo lado que el pico engrapado.





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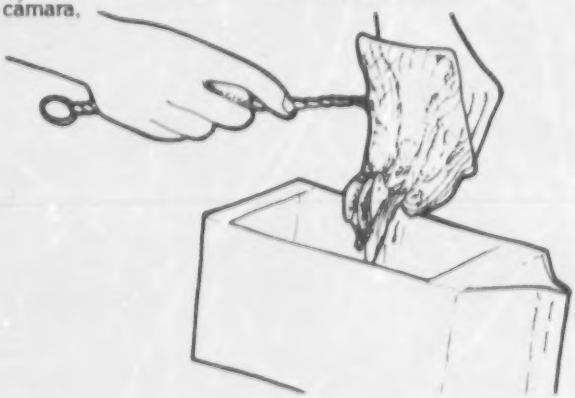
Transfiriendo los organismos a las cámaras de observación. Cuando use una red para transferir a los organismos, primero menee la red en el agua cuidando que no se salgan los organismos (puede hacerlo en el estanque o arroyo que está investigando), de esta manera se limpia de sedimentos que hayan sido recolectados. Llene más o menos un tercio de la cámara de observación con agua. Ponga el aro de la red sobre el envase, y

voltéela de adentro hacia afuera. Enseguida summerja la bolsa de la red en el agua de la cámara,

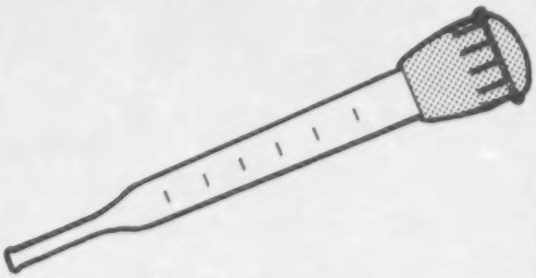


así habrá transferido los organismos a la cámara.

Vasitos de plástico transparentes y cucharas

Estos son útiles para acarrear organismos pequeños y para observarlos de cerca.

Simplemente tome unos organismos pequeños con una cuchara o vasito y póngalos en un envase con agua clara. Con un gotero gigante,



también se pueden acarrear organismos diminutos, succionándolos y transfiriéndolos a otro envase. **Nota:** Algunos de los materiales difíciles de obtener se pueden ordenar al *Lawrence Hall of Science*. Vea la forma en el folio de *Equipo de OBIS*.

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Hold It

Equipment Card
HOLD-IT TROUGH

MATERIALS FOR ONE TROUGH:

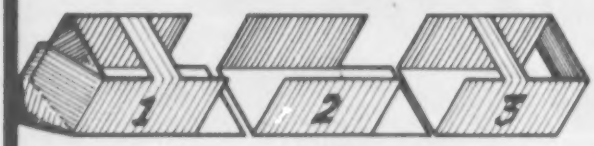
3 half-gallon milk cartons
1 sharp knife

1 stapler*
1 roll of waterproof tape (Mystic tape or duct tape)*

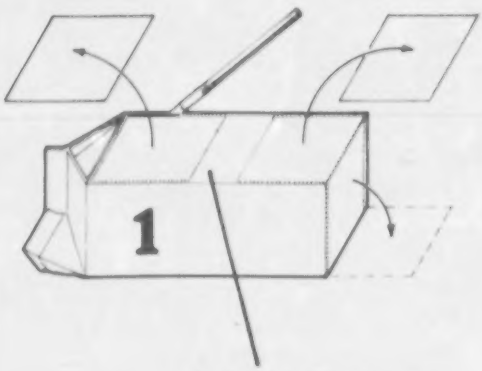
*These materials can be shared among the teams.

CONSTRUCTION OF THE TROUGH

The trickiest part is cutting the cartons. (For safety reasons, the leader should cut the cartons.)

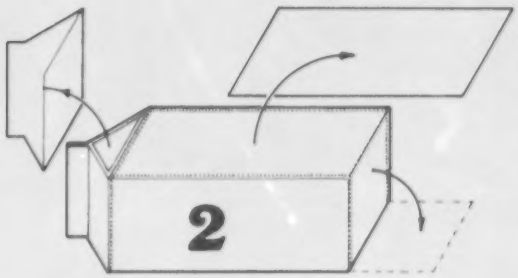


Carton #1
With the spout side *DOWN*, cut two windows in the top, then cut the bottom loose so it flaps down.

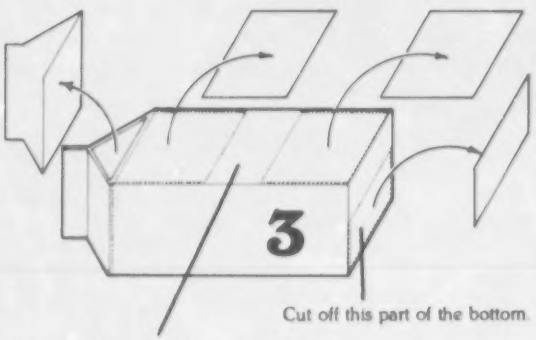


Leave this cardboard bridge.

Carton #2
Cut off the spout end and throw it away. Cut off one side and throw it away. Cut the bottom and flap it down.



Carton #3
Cut off the spout end and throw it away. Cut out two windows and throw them away. Cut the *lower half* of the bottom out. Make sure the half you cut is the one without the windows.



Cut off this part of the bottom.

Again, leave this bridge for strength.

Assembling the Three Cartons
Slip carton #2 part way into carton #1. (The edges of carton #1 should overlap with the edges

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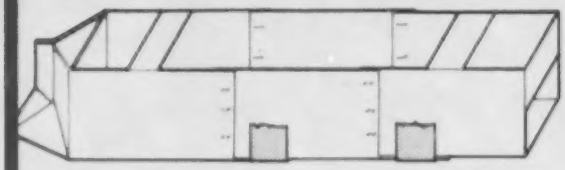
of carton #2 about two centimeters.) In the same way, slip carton #3 into carton #2.

Staple sides where cartons overlap and securely *tape* bottom flaps down.



There! You have a Hold-It Trough.

USE OF THE TROUGH

To use the trough, you will also need:
1 aquarium net
1 small plastic cup

The trough is a tool to use in investigating the ability of various aquatic organisms to withstand the force of currents. Here is how you use your trough:

1. Capture some stream critters and put them in a cup.
2. Install your trough in a shallow portion of stream. The cut-out bottom of Carton #3 should be upstream and the spout downstream. The current should run through your trough.
3. Choose the bottom material you want and arrange it in the bottom of your trough.
4. Put your net over the spout to catch any creatures that don't hold on.
5. Dump your stream creatures into the trough near the end where water enters the trough.
6. Observe how, where, and the speed at which different creatures grab hold.
7. Vary the speed of the trough currents by trying the trough in different areas.
8. Trough currents can be created artificially by dumping water just above the trough.

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Deteniéndose

PEQUEÑO CANAL DE AGUA

Tarjeta de Equipo

MATERIALES PARA UN CANAL

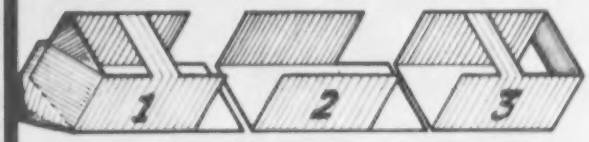
3 envases de cartón de leche de ½ galón
1 cuchillo filoso

1 engrapadora*
1 rollo de cinta adhesiva resistente al agua (cinta aisladora de conductores o *Mystic*)*

*Estos materiales pueden ser compartidos entre los equipos.

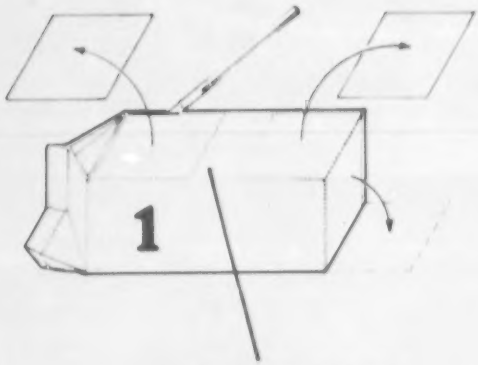
CONSTRUCCIÓN DEL CANAL

La parte más complicada en esto, es cortar los envases. (El dirigente debe hacerlo por razones de seguridad.)



Envase #1

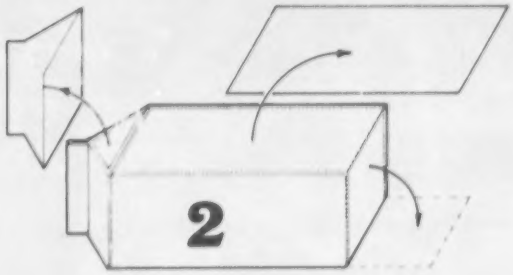
Con el pico abierto del envase hacia ABAJO, corte dos ventanitas en la parte de arriba y después recorte el fondo del envase como solapa para que caiga hacia abajo.



Deje este puente de cartón

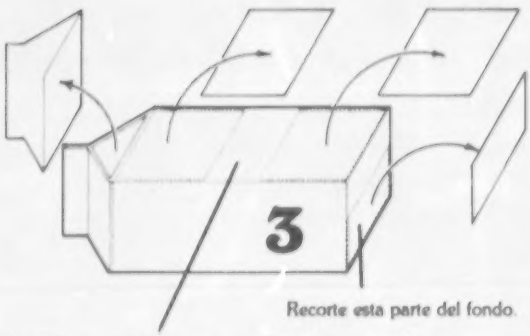
Envase #2

Corte la punta que tiene el pico y uno de los lados y descártelos. Recorte el fondo del envase como solapa para que caiga hacia abajo.



Envase #3

Recorte la punta que tiene el pico, dos ventanas y descártelas. También corte la mitad de abajo del fondo del envase. Asegúrese que la mitad que recorte es la que no tiene ventanas.



Recorte esta parte del fondo.

También aquí deje este puente para darle más resistencia.

Armando los tres envases

Deslice parte del envase #2 al envase #1. (De manera que las orillas del #2 estén sobrepuestas más o menos dos centímetros a las orillas del envase #1.) De este mismo modo, deslice el envase #3 en el #2.

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Engrape los lados donde los envases se sobreponen y pegue las solapas con cinta adhesiva para asegurarlas.

Aquí ya tiene usted un canal de agua.

ACERCA DEL USO DEL CANAL

Para usar el canal se necesitará:
1 red de acuario
1 vasito de plástico

El canal es una gran ayuda en la investigación de la capacidad que tienen algunos organismos acuáticos para resistir la fuerza de las corrientes. En seguida se indica como usarlo:

1. Atrape algunas criaturas del arroyo y póngalas en un vasito.
2. Instale su canal en una parte poco profunda del arroyo. El fondo cortado del envase #3 deberá ir río arriba (contra la corriente) y la parte del pico, río abajo. La corriente deberá correr a través del canal.
3. Escoja algún material para arreglar el fondo del canal y colóquelo.
4. Ponga la red en el pico final para atrapar cualesquiera organismos que no se detengan.
5. Eche los organismos acuáticos en el canal del lado por donde entra el agua.
6. Observe cómo dónde y a qué velocidad las diferentes criaturas se pueden detener.
7. Varíe la velocidad de la corriente del canal cambiándolo a diferentes áreas del arroyo.
8. Se pueden crear corrientes artificiales en el canal echando agua por encima de éste.

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Equipment Card
LITTER CRITTER WHEEL

With this device, youngsters become familiar with body parts of animals in the litter and develop observational skills. It takes about thirty minutes to assemble one wheel after all the materials are duplicated and gathered. Once assembled, the wheels can be used repeatedly.

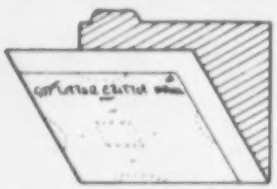
MATERIALS FOR ONE WHEEL:

- 1 8½" x 11" manila file folder
- 1 duplicated "Litter Critter Wheel Title Sheet" (xeroxed or dittoed)
- 1 set of 4 wheels (4 overhead transparencies: head, thorax, abdomen, wings)*
- 4 round-head paper fasteners
- 1 pair of scissors or single-edged razor blade
- • rubber cement or glue

*You can make these transparencies from the masters provided or order them from the Lawrence Hall of Science. See the "Equipment Order Form" in the *OBIS Toolbox* folio.

To Prepare the Wheel Folder:

1. Glue the Title Sheet to the file folder, lining up the bottom of the sheet with the folder as shown.

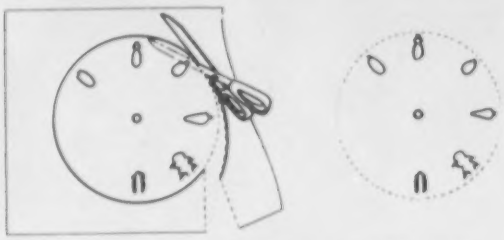


Reduce the folder to the size of the Title Sheet by cutting around the edge of the sheet. The Title Sheet accurately positions the window and also the paper fasteners for the wheel centers.

2. Open the folder and lay it flat with the Title Sheet facing up. With a single-edged razor blade, cut out the window in the Title Sheet, also cutting through the side of the folder on which the sheet is glued.

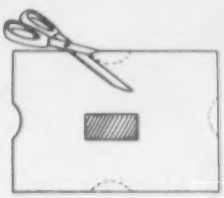
Make a tiny slit at each paper-fastener location through the Title Sheet and the one side of the folder. The slit allows you to push the paper fastener through the sheet more easily.

3. Cut out the transparent body wheels *inside* the black outline so that edge of the wheel is clear.

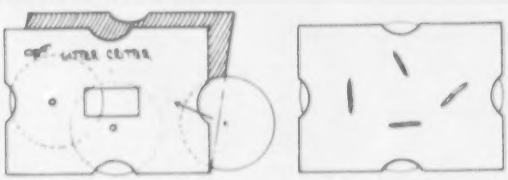


In the center of each wheel, cut a hole the width of the paper fastener so that the wheel will turn freely on the fastener, being careful not to make the hole too big.

4. Cut out the crescent-shaped pieces at the top, bottom, and two sides of the Title Sheet and file folder. These cuts should be made through *both* sides of the folder so the wheels can be turned easily.



5. Use the Title Sheet to guide you in positioning each wheel; put the thorax wheel in first and the wing wheel in last. Place each wheel in the folder and lock it in place with a paper fastener through the center. The paper fasteners should go through both sides of the folder.



6. Your wheel folder is now complete. Each body-parts wheel should turn freely on its fastener and the body parts should line up in the window so you can recreate animals of different shapes.

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To Use Your Wheel:

1. Find an animal and look at it closely.
2. Try to recreate your animal by turning each wheel until the best generalized body part appears in the window. You probably will not be able to find the exact body part, so choose the part that most closely resembles your animal's body part.
Note: If, in your area, you consistently find animals whose body parts cannot be found on these wheels, draw in additional body parts on the open spaces on each wheel. The best method for permanently including your own drawings is to draw them on the master wheel or a xerox of the wheel with pencil or black ink. Then make a new transparent wheel to put inside the folder.
3. You can record your animal by either tracing it on a Record Card, or by cutting out appropriate body parts from the Litter-Critter Body-Parts Sheet and taping them to a Record Card. Modify the generalized body parts with pencil and crayons to more accurately represent your animal.

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Bichos en la Hojarasca

Tarjeta de Equipo
RUEDA DE LOS BICHOS DE LA HOJARASCA

Con este artefacto los niños se familiarizan con las partes del cuerpo de los animales y desarrollan sus habilidades para observar. Con todos los materiales duplicados y acumulados, se requiere aproximadamente treinta minutos para armar una rueda. Ya estando armadas, las ruedas pueden ser usadas repetidamente.

MATERIALES PARA UNA RUEDA:

- 1 carpeta (de legajo) de papel de manila de 8½ x 11 pulgadas
- 1 copia de la hoja "Portada de la Rueda de los Bichos" (duplicada en *Xerox*)
- 1 juego de 4 ruedas (en forma de transparencias de proyector elevado; ruedas de cabezas, tórax, abdómenes y alas)*
- 4 sujetadores de papel (de cabeza redonda)
- 1 par de tijeras o una navaja de afeitar de un filo
- • goma de pegar (cola) o cemento de goma

*Estas transparencias se pueden hacer usando las hojas patrones o matrices *(Thermofax Masters)* que se incluyen u ordenándolas al *Lawrence Hall of Science*. Vea la "Forma para ordenar Equipo" en el folio de *Equipo de OBIS*.

Cómo preparar la carpeta de la rueda:

1. Pegue la hoja portada a una carpeta de legajo, acomodando el borde de abajo de la hoja con el de la carpeta como se muestra en la ilustración.

Corte alrededor de la hoja para reducir el tamaño de la carpeta al tamaño de la hoja. La portada coloca en su lugar a la ventanita y a los centros de las ruedas para poner los sujetadores de papel.

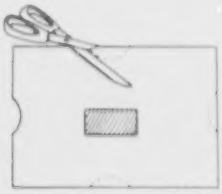
2. Abra la carpeta y colóquela acostada con la portada hacia arriba. Con una navaja corte la ventanita en la portada junto con ese lado de la carpeta.

Haga una pequeña incisión (en el lugar donde van los sujetadores) a través de la portada y del lado de la carpeta al que está unido. Así se podrá insertar los sujetadores fácilmente.

3. Recorte las ruedas transparentes de manera que la línea negra no quede en la orilla de las ruedas.

En el centro de cada rueda, haga un agujero del ancho del sujetador de papeles para que la rueda pueda dar vueltas fácilmente, cuidando al mismo tiempo de no hacer el hoyo demasiado grande.

4. Recorte los pedazos con forma de media luna que están a los cuatro lados de la portada. Estos cortes se deberán hacer en *ambos* lados de la carpeta para que las ruedas puedan moverse fácilmente.



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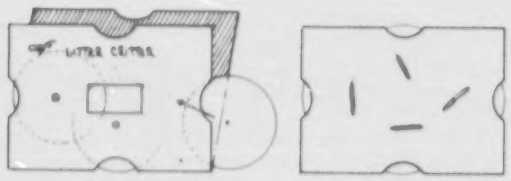
5. Use la portada para guiarse al colocar cada rueda; ponga primero la rueda de tórax y deje la de alas para el final. Los sujetadores deben traspasar ambos lados de la carpeta.



6. La carpeta de la Rueda está lista. Cada rueda en ella, deberá dar vueltas fácilmente en el sujetador y las partes del cuerpo deberán poderse alinear en la ventanita para que se pueda crear animales de varias formas.

Cómo usar la rueda:

1. Encuentre un animal y obsérvelo cuidadosamente.
2. Trate de formar la figura del animal dándole vueltas a cada rueda hasta que aparezca en la ventana la parte general del cuerpo más parecida. Probablemente no encontrará exactamente la misma parte, por lo que debe escoger la que más se parezca a la parte del cuerpo de su animal. **Nota:** Si en el área se encuentran muchos animales cuyas partes del cuerpo no están incluídas en las ruedas, dibuje usted mismo, partes adicionales en los espacios en blanco que quedan en cada rueda. La mejor manera de incluir sus dibujos permanentemente es haciéndolos a lápiz o tinta en la hoja patrón *(master)* o en una copia *Xerox* de ésta y de aquí se podrá hacer unas nuevas ruedas transparentes para ponerlas en la carpeta.
3. Para tomar datos de los animales, calque el modelo o dibújelo en una Tarjeta de Datos. Modifique las partes generales del cuerpo con lápiz y creyones para que así represente mejor al animalito.

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SEED-GO

Seed Dispersal

Look carefully at the plants in your surroundings. Decide how each plant disperses seeds and glue or tape a sample of its seed in the proper box. Some seeds may be dispersed in more than one way. The first person with five seeds in a row, in any direction, wins (same as Bingo).

	grass	trees	bushes	weeds	garden plants
wind					
water					
mechanical					
animals					
man					

REMEMBER:
In order to win, you may have to convince others that you are correct.

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BINGO DE SEMILLAS

Dispersión de Semillas

Observa cuidadosamente las plantas a tu alrededor. Trata de determinar la manera en que cada planta dispersa sus semillas y pega una de las semillas en el cuadro con el modo de dispersión correspondiente. (Usa cinta adhesiva o goma de pegar.) Algunas semillas pueden ser dispersadas en más de un modo. La primera persona con cinco semillas seguidas en cualquier dirección, gana (como en el bingo).

	pasto	árboles	arbustos	hierbas	plantas de jardín
viento					
agua					
mecánicamente					
animales					
hombres					

RECUERDA: Para ganar tienes que convencer a los demás que lo que tienes es correcto.

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Action Cards [Tarjetas de Acción]

Some of the folios contain activity cards, which must be duplicated in order to provide sufficient copies for the youngsters. All of the Action Cards are printed in English on one side and in Spanish on the other side. You may wish to give the youngsters either Spanish or English or both versions of the cards. These cards, and in some cases the equipment cards, may be duplicated on any copying machine and the master sheet saved for future activities. Do the copying before the activity period and, in the case of summer camps or wilderness situations, before leaving the office machine behind.

Most sheets of action cards contain four cards. Cut the copies apart and give one card to each participant or team, or in some cases a set to each team. In some of the activities, we provide blank cards for you to create additional challenges that are suited to your particular environment.

The activities that contain action or challenge cards are:

Ants [Las Hormigas]
Adaptation — Predator-Prey [Los Animales Rapaces]
Envirotopes [Ambientándonos]
Invent a Plant [Inventa una Planta]
Lichen Looking [Observando Líquenes]
Litter Critters [Bichos en la Hojarasca]*
Seed Dispersal [Dispersión de Semillas]
Roots and Shoots [Tallos y Raíces]

****Litter Critters,*** in addition to a sheet of Record Cards, contains two thermofax master sheets for the Litter Critter Wheel [Rueda de los Bichos de la Hojarasca], the Litter Critters Body Parts Sheet [hoja de las "Partes del Cuerpo de los Bichos"] and the Litter Critter Wheel Title Sheet [Portada de la Rueda de los Bichos de la Hojarasca]. These cards are printed in English on one side and Spanish on the other. Note: In assembling each Litter Critter Wheel, use either the English or the Spanish version of the title sheet, *not* both (i.e. not one on front and one on the back).

Miscellaneous Inserts

The activities that contain miscellaneous inserts are:

Food Chain Game: "Food Chain (Cadena Alimenticia)," an illustration of a food chain.

Invent a Plant: additional Action Cards (Tarjetas de Procedimiento), with instructions for using liquid plastic.

Roots and Shoots: "Prefixes, Roots, and Suffixes (Prefijos, Raíces y Sufijos)," lists of the different parts of words.

Lawn and Pond Organism Guides

Some activities require the use of a *Pond Guide* or *Lawn Guide*. These guides are designed for quick, easy identification of some of the most commonly encountered grassland and pond organisms. The names of the organisms are listed in both Spanish and English. Only those organisms readily observed by the unaided eye or by means of a simple magnifying lens have been included.

To use the guides, the youngsters simply flip through the pages until they come to a drawing that looks like the organism they wish to identify. Because the drawings are black and white and do not move, be sure to explain to your group that the organisms they are looking up may not exactly match the guide's drawings. The youngsters should look for the drawings that most closely resemble the organisms they have found.

Additional Lawn Guides and Pond Guides may be ordered separately from the Lawrence Hall of Science.

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These activities were adapted from activities in
OBIS Trial Editions Set I, Set II, and Set III.

A Component of the California Plan for the Education of Migrant Children
E.S.E.A., Title 1, P.L. 93-380

LAWN GUIDE

GUÍA PARA EL PRADO

LAWN GUIDE
[GUÍA PARA EL PRADO]

A guide for identifying organisms
found in and around the lawn.

[Una guía para la identificacion de
organismos que viven en el prado
o por los alrededores.]

Trial Edition June 1978

Outdoor Biology Instructional Strategies
Lawrence Hall of Science
University of California
Berkeley, California 94720

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A Component of the California Plan for the Education of Migrant Children
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PREFACE

OBIS is an NSF-supported project that is currently developing outdoor biology instructional activities for familiar, man-managed communities such as lawns, ponds, streams, farms and gardens. These activities are being designed for young people 10 to 15 years of age.

This guide was written as part of the OBIS activities for the lawn. It is designed for quick, easy identification of some of the most commonly encountered lawn organisms. Only those organisms readily observed by the unaided eye, or by means of a simple magnifying lens, have been included.

References are listed at the end of the guide. Both the artist and the author express their gratitude to the authors of the consulted works. Those desiring more information about lawn organisms would do well to refer to these publications.

WHERE TO USE THIS GUIDE

This is a guide to common plants and animals that can be found in and around lawns, pastures, vegetable or flower gardens, and vacant lots. You may not be able to find the exact plant or animal in this guide, but you may determine the general type.

Plants are easy to locate and closely examine because they do not run away. When you try to catch and observe any of the small animals in a lawn or garden, you may need to use a small net or plastic bag. A hand lens will help you in your observations. Do not collect the plants and animals; try to observe them in their original locations. If you must pick up the organisms, return them to the spot where you found them when you've finished looking at them.

HOW TO USE THIS GUIDE

The Lawn Guide is intended to be an easy reference for identifying organisms on the lawn. The organisms have been grouped according to general type.

There are two plant sections: Grass and Non-Grass. All the grasses have been shown with flowers, a situation rarely seen in regular lawn grasses. Except for weedy grasses which flower, it would be much too difficult to identify most of the lawn grasses. The Non-Grass plants are easy to identify, and many of the more common ones have been included in this guide.

For convenience, animals have been grouped in three sections. Small Flying Animals include those flying insects you will most often catch on or near the lawn. Small Non-Flying Animals include insects and other animals such as spiders, snails, and pill bugs. Big Animals include those most familair to you, such as birds, reptiles, and mammals.

Each organism is identified by a picture and a short description. Key descriptive words are underlined. In some cases, the picture of an animal is accompanied by a small drawing showing its actual size. The food habits for each animal are listed, and the length of each plant's life cycle is given. Less common terms are listed in the Glossary.

The small size of the guide lends itself to page-flipping until the right picture is found. The brief descriptions, particularly the underlined key words, can be checked to verify the identification and to find out about food habits or life cycle.

ACTIVITIES TO DO WITH THIS GUIDE

You can identify many plants and animals in the lawn with this guide, and you can do much more...

Can you find an animal or plant on the lawn near your house that can also be found on the lawn of your school?

Can you find the same animal or plant in another color?

Can you find the same animals active throughout the day?

Are there animals that are active only early in the morning or only in the evening?

How do the plants change during the day? (Pick out one plant and make hourly observations of it.) Is the flower open or closed? Which way do the leaves face? Is the plant wilted? Are there insects on it?

Wait three months. Can you find the same plants and animals you found before? Are there any new plants or animals?

Can you find a larva? What does it turn into? (Hint: leave the larva where you found it and make periodic observations until it hatches. Did you guess right?)

Can you find animals that have immature forms that do not look like the adult forms? Can you find ones where both adult and immature forms are similar? Do the immature forms eat the same things that the adult forms eat?

Find a plant. Identify it in the guide. Is it found all over the area or in one certain spot? What are some of the conditions under which the plant seems to grow best?

Which plants and animals are the most numerous?

Which animals and plants can always be found in lawn areas?

What is one of the biggest changes that happens to your lawn during a day? a week? a year?

These are just a few of the many observations and studies you can carry out on lawn areas. Try these activities, try some of your own, and have fun discovering the busy world of the lawn.

NON-GRASS PLANTS
[PLANTAS QUE NO SON PASTOS]

Chickweed [Alsine o Hierba Pajarera]

Slender, much-branched stems with a line of white hairs along one side. Leaves smooth and pointed. Likes it cool. Annual.

Scarlet Pimpernel [Muraje Escarlata]

Low growing. Stems branched. Most identifiable feature: under a clear sky salmon-colored small flowers are easily seen. Annual.

Dandelion [Diente de León]

Almost stemless, with jagged leaves growing in a circle around the base of the plant. Flower stalks rise from the base. Easy-to-see yellow flowers turning into familiar puff-ball seed head. Annual, biennial, or perennial.

Sedge [Juncia]

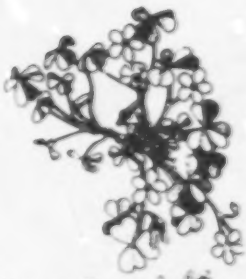
Very narrow and stiff-leaved plant. Without its flower it looks very grass-like. Unmistakable flower stalk: little clusters of green flowers growing at the base of six spike-like leaves. Triangular stem, usually taller than lawn. Grows in very wet areas.

Moss [Musgo]

Small, short, soft stemmed plants. Many plants to a patch. No flowers. Found in over-watered lawns. Annual.

Oxalis/Sourgrass [Acederilla/Aleluya]

Looks like clover, but not related. Prefers shade. Grows low with runners. Flowers yellow, small. Stems taste sour. Perennial.



Knotweed/Knotgrass [Centinodia/Sanguinaria]

Very low growing; forms circular mat. Found in areas with lots of foot traffic. Slender, wiry, non-rooting stems. Leaves bluish-green and smooth. Very small white flowers.

Mallow/Cheese Weed [Malba]

Stems low and spreading. Leaves roundish and broad. Fruit looks like little rounds of cheese. Annual or often a biennial.

Spurge [Euforbio]

Very low growing, stems form circular mats from single root. Stems and leaves are green or often reddish. Positive identification--pinched leaves yield a milky sap (poisonous). Annual.

English Daisy [Maya/Margarita de los Prados]

Low growing with oval leaves. Flowers stick up. Easy-to-see white or pinkish daisy-like flowers. Perennial.

Clover [Trébol]

Common, non-grassy lawn plant. Three-lobed leaf. Low growing, roots at joints. Flowers white, red, or pink. Perennial.

Burclover ["Trébol Espinozo"]

Related to clover. Clover-like leaf. Stems are low growing and spreading. Flowers are small and yellow. Seed pod or "bur" is spiraled and spiny. Annual.

Broadleaf Plantain [Llantén de "Hoja Ancha"]

Large, smooth, roundish leaves, 3 to 6 inches long. Flower stalks 3 to 6 inches long are easily seen sticking up from the plant's center. Perennial.

Narrowleaf Plantain/Buckhorn [Estrellamar/Llantén de "Hoja Delgada"]

Long, narrow leaves with parallel veins, 3 to 12 inches in length. Long flower stalks stick up above leaves. Perennial.

Thistle [Cardo]

Almost stemless, with leaves notched with long spines that hurt if touched at edges. Leaves are spiny and have short hairs and "pimples." Flowers, when present, are purplish. Perennial.

Curly Dock [Romaza "Rizada"]

Almost stemless, with large, reddish-green leaves that are curly and wavy along the edges, growing in a circle around the base of the plant. Flower stalks appear in the center of the plant and are green or reddish-brown in color. Perennial.

Bristly Oxtongue [Lengua de Buey "Cerdosa"]

Tallish. Coarse, rough-looking plant. Leaves covered with rough hairs and pimples. Flowers are yellow and look somewhat like small dandelion flowers. Biennial.

Dichondra ["Dicondra"]

Low, creeping stems, root frequently at nodes. Can form dense mats, or even "lawns." Leaves lily-pad shaped; 1/4 to 1-1/2 inches in width. Flowers rarely seen. Perennial.

Cutleaf Geranium [Geranios]

Low growing, many branches per plant. Leaves are divided into narrow fingers. Easily seen small purple flowers. Annual.

GRASS PLANTS [PASTOS/HIERBAS]

Since grasses are easy to identify when they are in flower, and only weedy grasses usually flower in a regularly mowed lawn, most of the grasses listed are weedy species. Flowers are usually green, brown or beige.

Crabgrass [Hierba Rastrera]

Fat leaves, yellowish-green in color, often hairy. Best way to tell is to look at flower. Spreads by seed and runners. Annual.

Bermuda Grass [Pasto de "Bermuda"]

Thick, coarse grass. Stems are smooth and wiry. Runners have many jointed parts with roots at each joint. Flower somewhat similar to crabgrass. Perennial.

Goosegrass ["Pasto Silvestre"]

Low, thick mat-forming grass, growing from central point. Appears as a silvery, pale green clump. Will flower even under constant mowing. Distinctive flower. Annual or short-lived perennial.

Ryegrass [Cizaña Vivaz/Ballico Perene]

Long, narrow leaf, hard to tell from regular lawn grass unless flowering; somewhat glossier than most grasses. Forms clumps. Annual or short-lived perennial.

Kentucky Bluegrass [*Bluegrass de Kentucky*]

Very common and desirable lawn grass. Can be identified in cut stage by looking with a hand lens at veins on upper side of leaf--look like railroad tracks running down the middle. Will flower along uncut edges of lawn; very tall, from one to two feet high. Perennial.

Annual Bluegrass [*Bluegrass Anual*]

Short, soft, light-green grass. Will continue to form flowers and seeds even under frequent mowing. Usually found in cool, frequently watered areas. Look for light-colored flowers growing on short grass plants in lawn. Annual.

Foxtail/Wild Barley [Cola de Zorra/Panizo]

Occurs as clumps, often in new or infrequently mowed lawns. The leaves are smooth, dull green. The mature seed heads look like a squirrel or fox tail, often sticking in socks or shoes.

FUNGI [HONGOS]

Mushrooms [Hongos o Setas]

Many kinds of fungi appear on lawns. Most are in the familiar toadstool shape. Others are button-like. They are usually white or light brown, but can range from bright red, blue, yellow to black. Many are poisonous. Mushrooms do not manufacture their own food, but live off decaying plant material.

SMALL FLYING ANIMALS [PEQUEÑOS ANIMALES VOLADORES]

Dragonflies [Libélulas]

Brightly-colored, fast-flying insects. Hard to catch. They have four large wings, which are held out when at rest, and a large head. Food: small flying insects.

Damselflies [Caballitos del Diablo]

Look like skinny dragonflies. Wings are held close together and point backwards when at rest. They are usually very brightly colored. Food: small flying insects.

Frit Flies ["Mosquitas Negras"]

Small black flies. Usually very numerous. Hover near lawn surface. Food: larvae feed on grass stems.

Houseflies [Moscas]

Several species of medium-large flies, all of which look something like the common housefly. The location of your lawn will determine the exact species. Stout-bodied, very active; single pair of wings. Food: scavengers on all sorts of decaying vegetable and animal waste matter.

Fungus Gnats [Jejenes]

Small, dark, mosquito-like, long-legged flies. With a hand lens you can see that the first segment of their legs is very long. Food: larvae feed on decaying vegetable matter and mushrooms; adults feed on the ooze from decomposing plant material.

Marchflies ["Moscas de Marzo"]

Small to medium-sized, clumsy, black flies can be very abundant in early spring and summer. Food: larvae feed on decaying vegetable matter and on the roots of plants.

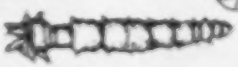
Mosquitoes [Mosquitos]

Skinny, long-legged small flies. Only one pair of wings, which are fringed with tiny scales and hairs (a hand lens is needed to see these). Most have long, piercing, sucking mouth parts. Food: females suck blood, males feed on nectar and plant juices.

Craneflies [Típulas]

Large mosquito-like fly, often orangish. Very clumsy and relatively common. Food: adults may feed on plant nectar or dew; larvae are scavengers or may feed on grass roots.

larva



Bees [Abejas]

Familiar honey bee with hairy, yellow and black striped abdomen. Usually found near or on clover, dandelion flowers, or other showy non-grass plant flowers. Food: pollen and nectar from flowers, nectar converted into honey back at hive.

Yellow Jackets [Abejorros]

Very showy insects with bright black and yellow markings on its non-hairy abdomen. These wasps are pesty and will sting if disturbed. Food: scavengers, very noticeable during picnics.

Small Wasps [Avispas Pequeñas]

Any of a number of species of small, black, narrow-waisted wasps. Common in small numbers at all times of the year. Food: most are parasitic, laying their eggs into a host insect; the larvae feed on that host from the inside, eventually killing the host.

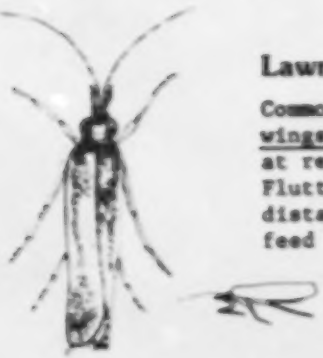
Butterflies [Mariposas]

Slender-bodied insects with large, often brightly-colored wings. Wings are covered with tiny scales. Antennae are slender with a swollen knob at the end. Food: adults often don't feed--if they do, usually on flower nectars; larvae feed constantly on plant material.

Pictured here:

Monarch - black and orange
Cabbage - white and black

Typical larvae or caterpillar



Lawn Moth [Polilla del Campo]

Common slender moth. Long and narrow, wings usually folded against body when at rest. Very distinctive "snout." Flutter about at dawn; will fly short distance when disturbed. Food: larvae feed on stems or roots of grass.

Aphids [Afidos]

Small, round, soft-bodied insects. With wings at certain times of year, without wings the rest of the year. Usually green, can be black or brown. With a hand lens, can see tiny pegs sticking up from rear of abdomen. Food: adults and young suck plant juices.

SMALL NON-FLYING ANIMALS [PEQUEÑOS ANIMALES QUE NO VUELAN]

Ladybug/Ladybird Beetles [Conchitas/Catarinas]

Medium-sized, round, reddish-orange beetles with black spots (or reverse coloring). Often very common. Can be seen crawling to top of a blade of grass, flying a short distance, and repeating the action. Food: both adults and larvae are predators; favorite food is aphids.

larva

Beetles [Escarabajos]

Many types of beetles can be found on lawns; only the ladybird beetle is common enough to be specifically identified here. Beetles range in size from less than 1/8 inch long to 1 inch long. Pictured here are two kinds likely to turn up. A ground beetle and a little flea beetle. Beetles are all hard-bodied and rarely fly. Their wings are folded under their hardened backs. Food: some are predators, others are herbivores, still others are scavengers. Ground beetles are mostly predators, flea beetle adults feed on leaves, and the larvae feed on the roots of plants, particularly dichondra. Larvae often eat different food than adults.

larva

Weevils/Snout Beetles [Gorgojos]

As their name implies, these are beetle-like in appearance, with the head more or less elongated into a snout. Weevils, like beetles, prefer to run rather than fly. Food: almost all feed on plant material.

200

Earwigs [Tijerillas]

Slender, medium-sized insects with large pincers on the end of the abdomen. Earwigs are largely active at night and hide during the day in cracks, crevices, and under objects. Food: mainly scavengers, but also eat live plants.

Grasshoppers [Chapulines, Saltamontes o Langostas]

Long-legged, jumping insects. Usually green or brown, they range in size from 1/4 inch to over 3 inches. Very large hind legs to aid in hopping, they also fly. Males sing by rubbing the inside of the hind leg against the lower edge of the front wing. Food: plant feeders

Leaf Hoppers [Chicharras]

Small bugs, very numerous at certain times of year. Oval-shaped body, segments not well separated. Will move sideways, hop, or fly. Often interesting coloration: black, brown and white, or all green, some with red markings. Food: suck plant leaf juices.

Springtails [Tisanuros o Colas de Resorte]

Tiny wingless insects that are very plentiful. They are named after their unique forked tails that they keep folded beneath their body. When disturbed, the tail springs downward, catapulting the insect into the air. May be dark-colored, yellowish, or colorless. Not likely to be caught with nets, but very likely found in traps. Very numerous in the soil. Hand lens is really needed to see them well. Food: scavengers, some feed on microscopic plants.

Ants [Hormigas]

Small, black (sometimes red), narrow-waisted, ground-dwelling insects (rarely, winged ones can be found). Often found in large numbers, in swarms or lines. Antennae are usually elbowed. Familiar insect, lives in large colonies. Food: varied; some ants are predators, some herbivores, others scavengers.

Aphids [Afidos]

Small, round, soft-bodied insects. With wings at certain times of year, without wings the rest. Usually green, can be black or brown. With a hand lens, one can see tiny pegs sticking up from rear of abdomen. Food: adults and young suck plant juices.

Spiders [Arañas]

Many kinds of spiders can be found on lawns. All have eight legs, two body segments, and piercing mouth parts. Many spin webs to catch their prey; others, like the wolf spider pictured here, don't have webs but pounce on their victims. Food: all are predators.

Mites [Mitas o Garrapatas]

Tiny spider-like animals; all adults have eight legs. Mites look like fast-moving dots. Colors vary; red, orange, brown, and black are most common. Food: varies; some are predators, others herbivores or scavengers.

Millipedes [Milípedos o Yulos]

Medium-sized, elongated, wormlike animals with many legs. Most millipedes have 30 or more pairs of legs, usually two pairs per segemnt. Often millipedes can be found rolled up into a ball. Food: most are scavengers.

Centipedes [Ciempiés]

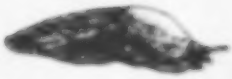
Medium-sized, elongated, flattened, worm-like animals with 15 or more pairs of legs. Each body segment has a single pair of legs. Very active and fast-running, unlike millipedes. Usually orange in color. Some will bite or sting if held in the hand. Food: predators.

Isopods/Pill Bugs/Sow Bugs [Isopodos/Chinches de Agua]

Medium-sized, oval-shaped, armored animals. Brown, black, or grey in color with yellow spots. Legs originate underneath the armored back and often can't be seen from the top. When alarmed, pill bugs roll up into a tight ball, or "pill. They live in cracks, crevices, or even out in the middle of the lawn. Mainly active at night. Food: mainly scavengers, but will eat fresh plant material

Snails [Caracoles]

Soft-bodied animals with a hard, coiled shell. Very small snails can be quite plentiful in lawns, especially ones around 1/16 inch. Food: fresh and decaying plant material.



Slugs [Babosas]

Look like snails without shells. Both snails and slugs travel on a slippery substance that they secrete; they thus leave a track where they have been. Food: fresh and decaying plant material.

Earthworms [Lombrices]

Segmented worms with a large band around the body about 1/3 of the distance from the head. Size varies from 1 inch to over 6 inches. Earthworms are very numerous in lawns, frequently come up after the lawn is watered or at night. Food: scavenger; eating material in soil.

BIG ANIMALS [ANIMALES GRANDES]

AMPHIBIANS [ANFIBIOS]

Almost all begin life in water with gills; later they develop lungs and come on land. Their skin is usually moist, either smooth or warty. Toads, frogs, and salamanders belong in this group. All of these animals may be found on lawns, but they are not regular visitors. Food: all are predators as adults.

Salamanders [Salamandras]

Frogs [Ranas]

Toads [Sapos]

REPTILES [REPTILES]

Have dry, scaly skin which they periodically shed. Snakes and lizards are common reptiles. Snakes are commonly found on lawns--lizards less often. Food: all snakes and most lizards are predators.

Snakes [Serpientes]

Lizards [Lagartijas]

BIRDS [PÁJAROS]

Have wings and feathers; nearly all fly. Many birds are common and important visitors to lawns. Robins, blackbirds, sparrows, and pigeons are pictured here. Food: robins are predators, feeding mainly on earthworms; blackbirds feed primarily on insects and spiders and on seeds; sparrows feed on insects and seeds; pigeons eat seeds almost exclusively.

Petirrojo

Mirlo

Gorrión

Paloma

MAMMALS [MAMÍFEROS]

Have fur or hair and nurse their young on milk. Most mammals are more active at night than during the day. Food:

House Mouse [Ratón Casero]

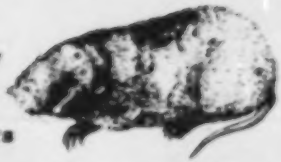
Eats seeds, or scavenges for whatever vegetable remains it can find.

Meadow Mouse [Ratón Campesino]

Eats grass and some seeds.

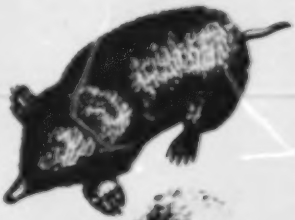
Gophers [Tuzas]

Live on roots of plants. (Gophers only leave dirt mounds at the entrance or exit to their tunnels; they seal their tunnels so you cannot stick your fingers into them.)



Moles [Topos]

Eat animals like earthworms and grubs. (Moles make shallow tunnels and leave holes you can stick your fingers into.)



Squirrels [Ardillas]

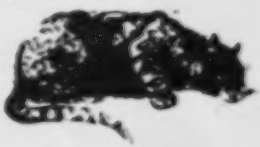
Do not feed directly on lawn, but will pick up or bury nuts on lawn.

Dogs [Perros]

Rarely eat on lawn, but do leave waste products (which serve as food for many other animals).

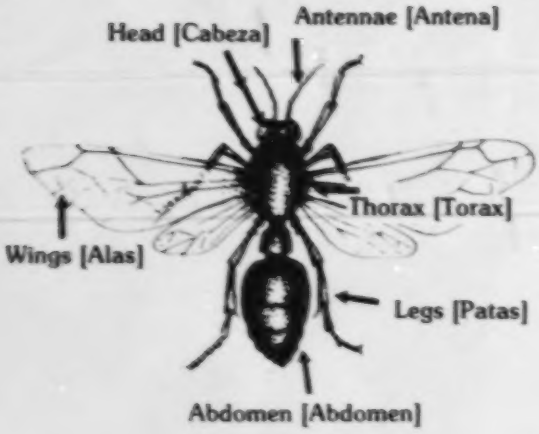
Cats [Gatos]

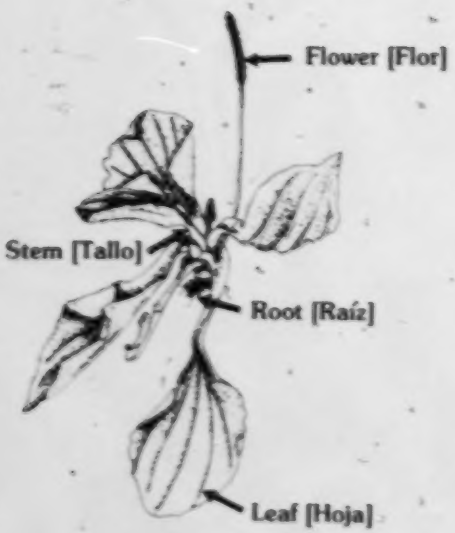
Occasionally eat gophers, mice, or moles.



Man [Hombre]

Very common; doesn't eat on lawn but does cut and remove grass. Kills big and small animals with traps and pesticides and plants with herbicides. Man also generally stomps on everything with his big feet.


Head [Cabeza]
Antennae [Antena]
Thorax [Torax]
Wings [Alas]
Legs [Patas]
Abdomen [Abdomen]


Flower [Flor]
Stem [Tallo]
Root [Raíz]
Leaf [Hoja]

GLOSARIO

***Predator* [*animal rapaz o depredador*]:** an animal that eats other animals.

***Herbivore* [*animal herbívoro*]:** an animal that eats plants.

***Scavenger* [*animal basurero*]:** an animal that eats dead or decaying plant or animal material.

***Annual* [*planta anual*]:** Plants that complete their life cycle from seed in one year.

***Perennial* [*planta vivaz (perene)*]:** plants that live longer than two years.

***Biennial* [*planta bienal*]:** plants that don't flower until second year; complete life cycle in two years.

***Runners* [*brotes rastreros*]:** long stems that grow close to the ground, rooting and sending up new leaves and stems.

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POND GUIDE

GUÍA PARA EL ESTANQUE

POND GUIDE
[GUÍA PARA EL ESTANQUE]

A guide for identifying organisms
found in and around the pond.

[Una guía para identificar organismos
que se encuentran cerca
de o en un estanque.].

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Outdoor Biology Instructional Strategies
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A Component of the California Plan for the Education of Migrant Children
E.S.E.A., Title 1, P.L. 93-380

PREFACE

OBIS is an NSF-supported project that is currently developing outdoor biology instructional activities for familiar, man-managed communities such as lawns, ponds, streams, farms, and gardens. These activities are being designed for young people 10 to 15 years of age.

This guide was written as part of the OBIS activities for the pond. It is designed for quick, easy identification of some of the most commonly encountered pond organisms. Only those organisms readily observed by the unaided eye, or by means of a simple magnifying lens, have been included.

References are listed at the end of the guide. Both the artist and the author express their gratitude to the authors of the consulted works. Those desiring more information about pond organisms would do well to refer to these publications.

Note: This guide was produced as an aid to the study and appreciation of pond life. We ask the users of this guide to leave the ponds and other freshwater systems they study as they found them so that others who follow may find the same pleasure in the sites.

WHERE TO USE THIS GUIDE

This is a guide to common aquatic organisms in ponds. If you do not have a pond nearby, try a forgotten bucket of water, a puddle, a quiet stream, or an edge of a lake or reservoir. While you may not be able to find the exact plant or animal described in the guide, you may find the general type.

When plants and animals can't be easily observed, a net or plastic bag on a pole will help you locate and catch them. Try to observe organisms in their natural settings; if you have to take the organism out to look at it, be sure to replace it when you've finished your examination. Placing animals in a plastic bag filled with water is a good way to observe them. A hand lens is also useful in your work.

HOW TO USE THIS GUIDE

The animal section has been organized by major groups or phyla. In some cases (Arthropods, for instance), groups have been broken down further.

The plant section has been organized by growing zones (i.e., shore, emergent, floating leaved and submerged plants).

The small size of the guide lends itself to page flipping until the desired illustration is located. The brief text can then be checked to verify the identification.

Size scales have been included with some animals as an aid to identification. The size scales represent the minimum and maximum body lengths of all the members of a particular order (leeches) or family (damselflies) of animals. Antennae and tail parts have not been included in these scales. For most of the smaller animals a scale size drawing has been included along with the illustrations.

ACTIVITIES TO DO WITH THIS GUIDE

You can identify many plants and animals in the pond with this guide, and you can do much more...

Find and identify a plant or an animal in the pond.

Can you find an animal or plant similar to the one you just identified?

Can you find the same animal or plant in another color?

Can you find the same animals active throughout the day?

Are there animals that are active only early in the morning or only in the evening?

How do the plants change during the day? (Pick out one plant and make hourly observations of it.) Is the flower open or closed? Which way do the leaves face? Is the plant wilted? Are there insects on it?

Wait three months. Can you find the same plants and animals you found before? Are there any new plants or animals?

Can you find a larva? What does it turn into? (Hint: leave the larva where you found it and make periodic observations until it hatches. Did you guess right?)

Can you find animals that have immature forms that do not look like the adult forms? Can you find ones where both adult and immature forms are similar? Do the immature forms eat the same things that the adult forms eat?

Find a plant. Identify it in the guide. Is it found all over the area or in one certain spot? What are some of the conditions under which the plant seems to grow best?

Which plants and animals are the most numerous?

Which animals and plants can always be found in ponds?

What is one of the biggest changes that happens to your pond during a day? a week? a year?

These are just a few of the many observations and studies you can carry out in ponds. Try these activities, try some of your own, and have fun discovering the busy world of the pond.

INVERTEBRATES [INVERTEBRADOS]

are animals without backbones. They comprise 95% of the animal kingdom as far as numbers of species are concerned. Includes coelenterates (i.e., jelly fish), worms and leeches, mollusks (i.e., clams), arthropods (crustaceans, arachnids, insects), echinoderms (i.e., starfish), and other miscellaneous animals.

COELENTERATA [CELENTERADOS]

means hollow gut and refers to the fact that the main cavity of the body is the digestive cavity. Includes hydras, jelly fish, sea anemones, and corals. Most coelenterates are marine.

Hydras [Hidras]

have a stalk-like body with tentacles encircling the mouth. They look like a half-inch of string with the unattached end frayed out into several strands.

EARTHWORM GROUP [GRUPO DE LOS GUSANOS O LOMBRICES DE TIERRA]

includes worms with segments. Segmented (divided into parts) worms appear to be ringed. The earthworms, leeches, and tubifex worms belong in this group.

Leeches [Sanguijuelas]

are flattened, ringed worms that have both a tail and mouth sucker. They feed on the blood of vertebrates and other invertebrates. Some species may reach over a foot in length.

Tubifex Worms [Lombrices de Tubo]

are slender, reddish worms that live in the soft bottom mud. They construct dirt tubes out of which only the hind part of their bodies is extended.

FLATWORMS [GUSANOS PLANOS]

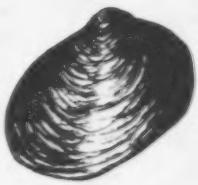
includes flattened, unsegmented (unringed) worms such as the familiar Planaria. Many flatworms appear cross-eyed.

MOLLUSKS [MOLUSCOS]

possess soft bodies and usually a shell. The mollusks contain mussles, clams, snails, slugs, squids, and the octopus.

Clams and Mussels [Almejas y Mejillones]

are distinguished by their bi-valved (clam-like) shells hinged at the back.



Snails [Caracoles]

usually have a single-coiled shell.

ARTHROPODS [ARTRÓPODOS]

are animals with jointed legs and segmented bodies. Includes crustaceans, arachnids, and insects.

Crustaceans [Crustáceos]

are primarily aquatic. They have an outer shell, or exoskeleton, and nearly all crustaceans breathe by means of gills.

Crayfish [Cangrejo de Rio/Calamares]

have five pairs of legs. The first pair is armed with claws. They look and behave like miniature lobsters.

Scuds **[Salpicaduras]**

have arched backs and narrow bodies and are shaped like fleas.

Water Fleas **[Pulgas de Agua]**

are tiny crustaceans covered by a transparent shell. Their internal structure shows up very clearly under magnification. Their gut appears as a dark tube (j-shaped in Daphnia) running through the body length.

Copepods **[Copepodos]**

appear as little white specks darting through the water. They move in a jerky manner. Magnification shows them to be pear-shaped.

Seed Shrimp **["Camarones de Semilla"]**

are small crustaceans with bi-valved shells. They move by sticking their slender legs and antennae from between the shells and kicking them rapidly backward.

Arachnids [Aracnidos]

are members of the arthropod group with eight legs. Includes ticks, scorpions, spiders, and water mites.

Spiders [Arañas]

have bodies divided into two segments: a head and an abdomen. The fisher spider is one of the few spiders that spends its life in or near water.

Water Mites **[Mitas o Garrapatas de Agua]**

are usually no more than 0.2 inch long. Their bodies appear to be of one segment. They commonly appear as brightly colored spots swimming or walking about in the water.

Insects [Insectos]

are the most successful group of animals both in terms of numbers of species and total numbers. Adults have three body regions: head, thorax, and abdomen. The middle region (thorax) bears three pairs of jointed legs and the majority are equipped with one or two pairs of wings.

True Flies [Moscas]

have only one pair of wings and include the mosquitoes, midges, craneflies, and houseflies.

Mosquitoes [Mosquitos]

have one pair of transparent wings and most are equipped with a long piercing and sucking tube for obtaining their food. A hand lens reveals that mosquito wings are fringed with tiny, colorful scales and hairs. Only females suck blood.

Mosquito Larvae [Larva de Mosquito]

are commonly called wrigglers because of their wriggling motion as they swim. Mosquito larvae appear hairier than midge or cranefly larvae. Wrigglers hang downward from the surface film and breathe by means of gills and an air tube.

Mosquito Pupae [Pupa de Mosquito]

look like large commas and move about using their flaplike tail parts. They usually last only a few days before the adult mosquito emerges.

Midgeflies [Moscas Pequeñitas o Dipteras]

resemble mosquitoes but are usually smaller and more delicate. A hand lens shows their wings are bare and not covered with scales like the wings of mosquitoes.

Midgfly Larvae [Larvas de Mocas Pequeñitas]

are slender and wormlike and many construct soft dirt cases around their bodies. Many midgeflies have larvae which are blood-red in color and are commonly called blood worms.

Midgefly Pupae [Pupas de Moscas Pequeñitas]

are also slender with a slightly enlarged head region. Midgefly pupae don't appear as hunched up as mosquito pupae.

Craneflies [Típulas]

look like giant mosquitoes. They are long and slender and their extremely long legs mark them as the "daddy-long legs" among flies.

Cranefly Larvae [Larvas de Típulas]

are larger than either mosquito or midgefly larvae. They are brownish to whitish and often appear quite transparent. True cranefly larvae have a breathing disk at the end of their tail.

Cranefly Pupae [Pupas de Tipulas]

are pale colored, sluggish, and do not eat. Most craneflies go to shore to pupate in soft, damp soil.

Water Bugs [Bichos Acuáticos]

have jointed mouth parts for piercing and sucking. Most have two pairs of wings. The young water bug nymphs look like smaller models of the adults with shorter wings.

Backswimmers [Barquilleros de los Estanques]

are unique among aquatic bugs in the respect that they always swim on their backs. Their backs are shaped like the bottom of a boat and they use their long, hind legs to propel themselves through the water. Their bite is painful.

Water Boatmen ["Barqueros de Agua"]

resemble backswimmers in shape but differ in that they swim on their stomachs and do not have a keeled underside. They propel themselves through the water with their long middle and hind legs.

Water Scorpions [Alacranes de Agua]

have a breathing tube that is formed when they press their two, long, grooved tail filaments together. The water scorpion illustrated looks like an aquatic walking stick. The other type of water scorpion has a stout, oval-shaped body. Both types use their first pair of legs for seizing prey.

Water Striders [Geridas]

are named after their ability to rapidly skim or skate on their spiderlike legs over the surface of the water. They prefer quiet or gently flowing water. They range in size from the tiny broad-shouldered water striders with bodies about 1/8 inch long, to the large water striders with 3/4 inch long bodies.

Giant Water Bugs [Bichos/Chinches de Agua Gigantes]

may reach 3 inches in length, making them the largest true bugs. They have wide, flat, oval bodies and can inflict a very painful bite. Their strong front legs are similar in form and action to the front legs of the water scorpions.

Beetles [Escarabajos]

make up one of the largest insect groups. They generally have four wings, but the thick, heavy, front pair serve as wing covers for the hind wings and as a protective back armor. Only a few species live in the water. Their larvae have three pairs of legs.

Predaceous Diving Beetles [Ditíscidos]

make up the major group of water beetles. They are usually observed with the tip of their abdomen at the water's surface and their head below the surface. They have an oval, flattened shape and their shiny compact bodies are generally colored black to brownish-black. Diving beetles have slender, thread-like antennae. Their larvae are commonly called water tigers.

Whirligig Beetles [Escarbajos Molinetes]

are easily recognized from their whirling, circling motion on the surface. The smooth form of their oval, flattened bodies is broken only by their front legs which project from the sides of the body just behind the head. Their eyes are divided into two parts which allow them to see both above and below the water at the same time. They are blue-black or bronze in color.

Scavenger Beetles ["Escarabajos Enterradores"]

resemble diving beetles but can be easily distinguished by their short, club-shaped antennae. They also differ from diving beetles in that they rest in a heads-up position when they are at the surface rather than head down.

Miscellaneous Insects [Insectos Miscelaneos]

comprise those insects that do not fit in the three preceding categories.

Butterflies and Moths [Mariposas y Polillas]

have four wings that are covered with tiny, overlapping scales. The powder-like scales easily rub off when the wings are touched or handled.

Butterflies [Mariposas]

are generally slender-bodied, brightly colored insects. They have antennae that are swollen at the tips into lumps or knobs.

Moths [Polillas]

are usually heavy bodied and dull colored. The easiest way to distinguish a moth from a butterfly is to look at its antennae. Moth antennae are variously shaped, but not clubbed.

Butterfly and Moth Larvae [Larvas de Mariposas y Polillas]

are commonly called caterpillars. They are wormlike but possess three pairs of legs near the head region and five pairs of leglike structures from the middle to the end of their bodies. Caterpillars have tremendous appetites and moult several times before changing into pupae.

Butterfly and Moth Pupae [Pupas de Mariposas y Polillas]

are usually compact, immobile structures that take no food. The pupa is a resting stage during which the insect reorganizes internally to form the adult.

Dragonflies [Libélulas]

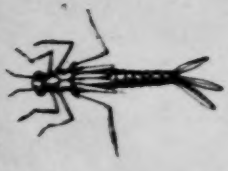
resemble short crayons with four large wings which are finely laced with veins. Dragonflies hold their wings in a horizontal position when resting.

Dragonfly Nymphs [Ninfas de Libélulas]

are usually dull-colored, slow-moving organisms that use a scooplike lip to capture their food. The dragonfly nymphs are generally large and chunky in comparison to the damselfly.

Damselflies [Caballitos del Diablo]

resemble matchsticks with four membranous wings. They are slimmer and more delicate-looking than dragonflies. Damselflies hold their wings close together and pointing backwards when resting.



Damselfly Nymphs [Ninfas de Caballito del Diablo]

are slimmer and more delicate looking than the dragonfly nymphs. These nymphs have three leaf-shaped gills at the tips of their abdomen.

Mayflies [Moscas de Mayo o Efímeras]

are delicate-looking insects that possess two or three long, threadlike strands projecting from the tip of their abdomen and four nearly transparent wings. When resting, the wings are held close together and pointing vertically.

Mayfly Nymphs [Ninfas de Moscas de Mayo]

are similar to damselfly nymphs but they appear stouter and their tail flaps are usually longer and featherlike. Mayfly nymphs also have smaller heads and lack a scooplike lip for capturing food.

Caddisflies [Gusanos de Paja]

are mothlike insects with four, soft, hairy wings and long slender antennae.

Caddisfly Larvae [Larvas de Gusano de Paja]

live in little cases or tubes which they construct from pieces of wood, leaves, sand, and silk. Most caddisfly larvae build portable cases which they drag about whenever they travel. During travel only the front end of the body and the legs stick out from the case.

Springtails [Tisanuros/Colas de Resorte]

are tiny, wingless insects commonly found on the water's surface near shore. They are named after their unique forked tails that they keep folded beneath their body. When disturbed, the tail piece suddenly springs downward to lift the springtail up into the air.

VERTEBRATES [VERTEBRADOS]

are animals with backbones. They comprise 5% of the animal kingdom. Includes fishes, amphibians, reptiles, birds, and mammals.

FISH [PECES]

spend their lives entirely in water. Fish breathe by means of gills. They have fins and their streamlined bodies are usually covered with scales.

AMPHIBIANS [ANFIBIOS]

begin life in water with gills and later develop lungs. Their skin is thin, scaleless, smooth or warty, usually moist, and not waterproof. Frogs, toads, and salamanders belong in this group.

Frogs [Ranas]

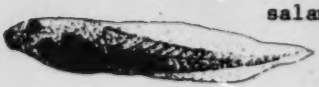
are smooth-skinned with long, powerful hind legs. Tree frogs have toes with enlarged tips.

Toads [Sapos]

possess a warty skin, large neck glands, and are rarely found moving about during the day. Toads have shorter back legs than frogs.

Tadpoles [Renacuajos]

are the well-known larval stage of frogs and toads. They are completely aquatic and do not possess external gills like salamander larvae.



Salamanders [Salamandras]

also include newts. They have a lizard-like body but lack claws. They have a moist, scale-less skin.

Salamander Larvae [Larva de Salamandras]

are completely aquatic and possess external gills.

REPTILES [REPTILES]

breathe by means of lungs. Their skin is dry, scaly, waterproof, and thick. Snakes, lizards, and turtles are familiar reptiles.

Lizards [Lagartijas]

have movable eyelids and usually have limbs with clawed toes.

Snakes [Serpientes]

have no limbs and non-moving eyelids.

Turtles [Tortugas]

have a body shell into which they can draw their heads and limbs.

MAMMALS [MAMÍFEROS]

have milk glands for nursing their young and at some time in their lives possess hair or fur. Most mammals are more active at night (nocturnal) than during the day (diurnal).

Raccoons [Mapaches]

are easily identified by his black mask and black-ringed tail. Look for his handlike tracks along muddy shores and stream banks.

Deer [Venado]

are large, browsing mammals. Males start to grow antlers in the spring and shed them each year in late winter.

Mice [Ratones]

are small, gnawing mammals. Usually one obtains just a glimpse of these small animals as they dart away. The house mouse came to America from Europe as a stowaway on early ships.

Muskrats [Ratas Almizcleras]

are ratlike but chunkier with a thick, naked tail. They are good swimmers.

Shrews [Musaranas]

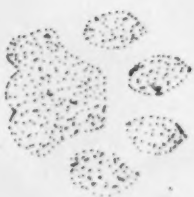
are the smallest, living mammals. The pygmy shrew may weigh less than a tenth of an ounce when full grown. Mouse size or smaller, shrews are distinguished by a pointed snout, pinpoint eyes, and tiny ears.

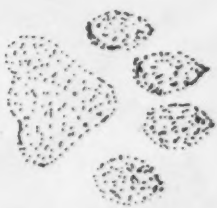
Bats [Murciélagos]

are familiar as the only true flying mammals. They possess great maneuvering ability and are often seen flying above lakes, ponds, rivers, and streams at dusk.

"Tracks [Huellas]"

of dogs and cats may commonly be found around the edges of ponds and lakes.





PLANTS [PLANTAS]

SHORE [RIBERA U ORILLA]

Willows [Sauces]

prefer wet or moist soils and often grow near bodies of fresh water. They vary in size from small shrubs to large trees. Willows are easily identified by their narrow, pointed leaves.

Horsetails [Equisetos o "Colas de Caballo"]

are fernlike plants that often grow near the edge of ponds and streams and in other moist areas. The successive whorls of side stems around the main stem gives the plant a shaggy, taillike appearance. Horsetails feel rough and abrasive because of their high silicon content.

Sedges [Juncias]

are grasslike or rushlike plants. They often appear as spikes with grasslike leaves. Their stems are three-sided and appear triangular in cross section. They generally grow from 1 to 3 feet tall.

EMERGENT [EMERGENTES]

Cattails [Aneas o Espadañas]

are among the most familiar marsh and waterside plants. They grow 4 to 8 feet tall and new plants arise from their creeping root-stocks and seed. The seed clusters form the most characteristic feature of cattails, the dark brown cattail head.

Spike Rushes ["Juncos Espigosos"]

are characterized by naked stems which are topped by a single flower or seed cluster. They usually grow in tight bunches and average from 2 to 5 feet in height.

Bulrushes [Juncos de Laguna]

include the familiar Tules. They may grow in water up to 9 feet deep; the Tule or great bulrush grows to a height of 15 to 20 feet. They usually appear as great spikes with a flower or seed cluster near their tips.

Rushes [Juncos]

are similar to bulrushes but lack their size. Rushes average about 1 foot in height and usually have hollow stems. There are two forms; one is essentially a naked stem with a sheath at the base, the other bears flattened leaves along its stem. Like the bulrushes, the flowers and seed clusters are found near the top of the stem.

Bur-reeds ["Carrizos con Erizos"]

are named after their closely packed seed clusters which resemble large burs. They are close relatives of cattails and are often found growing with them. Bur-reeds have long, slender flattened leaves like cattails and vary in height from 1 to 6 feet.

Water Plantain [Llanten de Agua]

grows close to pond edges and in other shallow, wet places. The pointed, oval leaves all arise from the base of the plant. The flower spray is supported on a long slender stem. The tiny flowers have three petals. Water plantain normally reaches 1 to 3 feet in height.

Arrowheads [Sagitarias]

are named after their arrow-shaped leaves. Their three-petaled flowers are arranged in whorls of three on a long, slender stem. Arrowheads bear edible tubers or thickened roots which have given rise to such names as duck potato and delta potato. Arrowheads grow to 2 feet high.

Water Cress [Berros]

is a sprawling herb that grows in moist to aquatic places. It was introduced from Europe and is often used in salads. Rooting occurs at the stem nodes or joints and in this manner water cress may spread to form dense stands in cold, spring-fed ponds and streams. It has compound leaves (two or more leaflets to a leaf) and white flowers which are borne on the stem tips.

Mare's Tail ["Corregüela Hembra"]

belongs to the Milfoil family. It has hollow stems that may be partially or completely submerged. The narrow, short leaves are arranged on the stem in whorls of six to twelve leaves each. The stem varies from 10 to 18 inches in height and a line of stems often arise from a single, rope-like rootstock.

FLOATING [FLOTANTES]

Duckweed [Lenteja de Agua]

is known as the smallest flowering plant. Duckweed has a tiny leaflike body which may or may not bear rootlets. The leaf-like plants float at the surface and often grow so densely they appear as a green carpet covering the surface of small ponds and ditches. Duckweed reproduces by breaking apart in addition to bearing seeds.

Water Ferns [Helechos Acuáticos]

are tiny floating ferns with scalelike, lobed leaves, and hanging roots. They often form dense reddish-green mats that can cover the entire surface of small ponds and ditches and shade out water plants beneath the surface. They reproduce by breaking apart; the broken fragments then grow into new plants.

Water Shamrocks [Lupulinas o Trébol Acuático]

are amphibious ferns that are often found in shallow water of seasonally fluctuating depth. They are named after their clover-like leaflets. These leaflets are usually found floating on the water surface and are attached by long, slender stalks to a creeping stem rooted in the mud.

Yellow Pond Lily ["Lirios Amarillos Acuáticos"]

is one of the familiar water lilies. It is characterized by large floating heart-shaped leaves that are attached by long stems to the base of the plant rooted in the mud. The large, yellow flower is tuliplike and bears six to twelve petals. The stems vary from 4 to 15 inches long.

Water Shield ["Escudo de Agua"]

is similar to the pond lily with its long-stemmed floating leaf blades. The leaf blades are oval rather than heart-shaped, however, and the reddish-purple flower is far from tuliplike and appears only briefly. The stems range from 1 to 4 feet in length.

Water Milfoils [Milefolios de Agua]

have stout stems that vary from 1-1/2 to 3 feet long and bear leaves in whorls of three to six. The milfoils may be partially or completely submerged. The submerged leaves differ in size and shape from the leaves that are above the water. The milfoils' tiny flowers grow near the stem tips.

Aquatic Buttercup [Ranúnculo Acuático]

bears the characteristic yellow or white buttercup flower with five petals. Submerged leaves are finely divided as opposed to the three-lobed floating leaves. The submerged plant stems appear whitish.

SUBMERGED [SUMERGIDAS]

Bladderworts [Utricularias]

have long slender stems that may be submerged or floating. The stems bear leaves that are so finely branched they look like a capillary system. To the finely branched leaf segments are attached the bladder-like traps that give the plants their name. The tiny bladders are effective in trapping minute water animals.

Filamentous Algae [Algas Filamentosas]

belong to the green algae group which is more abundant in ponds and lakes than all the alga groups combined. Filamentous algae appear as very thin green strands that often form dense submerged mats.

Elodea [Elodea]

or Anacharis grows entirely submerged as a loosely rooted or free-floating plant. The branched stems are crowded with green, translucent, narrow leaves arranged in whorls of three or more. Elodea spreads with amazing speed and may literally fill up a pond or slow stream and crowd out other plants.

Hornwort ["Hierbas Cornudas"]

is also known as coon tail because of the dense whorls of leaves arranged about the stems. The narrow, forked leaves bear small teeth or horns along their margin. Hornwort has no true roots and its tiny flowers are fertilized underwater.

Pondweeds [Hierbas del Estanque]

make up the largest group of truly aquatic seed plants. All of them grow rooted to the bottom and most grow completely submerged except for their flowers. The group shows a wide variation in leaf shape and size. Many pondweeds have long underground stems and tubers that give rise to new plants. The pondweed illustrated is one of about forty species.

Water Nymphs [Ninfas de Agua]

appear as slender, many-branched plants that grow completely submerged. They have leaves that bear a characteristic serrated or toothed margin. The leaves broaden abruptly at their base. The flowers and seeds are found inside the leaf bases.

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June 1977 OBIS Equipment Order Form

Shipping Address (Please print):

Name: _____ **Date:** _____

Address: _____

City: _____ **State:** _____ **Zip:** _____

Please send me the following items in the quantities indicated:

QUANTITY	ITEM — DESCRIPTION		UNIT SHIPPING WT. (Kg.)	TOTAL WT. (Kg.)	UNIT PRICE	TOTAL PRICE
	Blacklight bulb for safari lamp	each	.05		$8.97	
	Blacklight fluorescent tracing powder	20 gr. pkg.	.10		.95	
	Blueprint paper (22 cm x 30 cm sheet)	25 sh. pkg.	.20		1.75	
	Bug box	each	.01		.35	
	Colbat chloride crystals	110 gr. pkg.	.15		3.75	
	Colbalt chloride test paper (1 cm x 15 m roll)	each	.025		3.00	
	Colored cellophane (25 cm x 30 cm sheet)	red, each	.025		1.00	
		green, each	.025		1.00	
		blue, each	.025		1.00	
	Confectioners dye (10 grams in vial)	each	.020		1.00	
	Kodak Studio Proof F paper (20 cm x 25 cm sheet)	10 sh. pkg.	.15		2.40	
	Line level	each	.025		1.40	
	Litter Critter Wheels thermolax transparencies	1 set of 4 wheels	.050		.35	
	Magnifying lens (3 lenses: 3x, 5x, 8x, plastic frame)	each	.025		1.00	
	Meter tape	each	.025		.50	
	Ozalid paper (21.5 cm x 28 cm sheet)	25 sh. pkg.	.15		1.00	
	Plastic measuring cup (250 ml)	each	.020		.30	
	Plastic vials with lid (14 dram)	pkg. of 10	.150		1.30	
	Spring scale (2000 gram)	each	.070		3.00	
	Thermometer, calibrated in °C	each	.025		1.25	
	Tweezers	each	.10		.40	
	Water Breathers dropper	each	.010		.20	
	OBIS Lawn Guide	each	.05		.60	
	OBIS Pond Guide	each	.05		.60	
	OBIS Trial Edition, Set I	each	1.20		8.50	
	OBIS Trial Edition, Set II	each	1.20		9.50	
	OBIS Trial Edition, Set III	each	1.20		10.50	
	The OBIS Trail Module	each	.05		2.00	

Subtotal Wt. (Kg.) **Subtotal**	
California sales tax for California residents only: (6% California residents) (6½% Bart County residents)	
Shipping fee (see reverse)	
TOTAL DUE	

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☐ Please check here if you desire air mail shipment.
OTHERWISE ALLOW FOUR WEEKS FOR DELIVERY.
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PLEASE RECHECK YOUR COMPUTATIONS AND BE SURE THAT THE SHIPPING FEE IS CORRECT.

Rec'd on _____ By _____ Shipped on _____ By _____

To Determine Your Shipping Fee:

1. **Total the weight of merchandise.**
2. **Use Table A to find your shipping zone.**
3. **If you desire surface shipment, find the shipping charge in Table B. Allow at least four weeks for delivery.**
4. **If you prefer faster (1 week or less) airmail shipment, check the box on the front of this form, and find the shipping fee in Table C.**
5. **Enter the shipping fee in the appropriate box on the front of this form.**

Table A — Shipping Zone

Zip Code Prefixes	Zone	Zip Code Prefixes	Zone	Zip Code Prefixes	Zone	Zip Code Prefixes	Zone	Zip Code Prefixes	Zone	Zip Code Prefixes	Zone
008-098	8	530-534	8	674-679	6	770-787	7	850-859	5	955	3
		535-540	7	680-681	7	788	6	860-864	4	956-959	2
100-199	8	541-543	8	683-693	6	789	7	865-880	5	960-961	3
		544-567	7			790-797	6	881-882	6	962-966	1
200-299	6	570-577	6	700-704	8	798-799	5	883	5	967-969	8
		580-582	7	705-706	7			884	6	970-974	4
300-379	8	583-588	6	707-708	8	800-826	5	890-893	4	975-976	3
380-381	7	590-591	5	710-729	7	827	6	894-897	3	977-979	4
382-385	8	592-593	6	730-739	6	828-832	5	898-899	4	980-985	5
386-387	7	594-599	5	740-745	7	833	4			986	4
388-399	8			746	6	834-835	5	900-928	4	987-992	5
		600-609	8	747	7	836-837	4	930-935	3	993	4
400-499	8	610-617	7	748	6	838	5	936-939	2	994	5
		618-619	8	749-762	7	840-844	4	940-951	1	995-997	8
500-508	7	620-667	7	763-764	6	845	5	952-953	2	998	7
510-511	6	668-672	6	765-767	7	846-847	4	954	1	999	6
512-528	7	673	7	768-769	6						

Table B — Surface Shipment

WEIGHT UP TO:		.5 Kg.	1 Kg.	2 Kg.	4 Kg.	6 Kg.	8 Kg.	10 Kg.	12 Kg.	14 Kg.
YOUR	1-3	1.50	1.50	1.50	1.75	2.00	2.25	2.50	2.75	3.00
ZONE	4-6	1.50	1.50	1.75	2.25	2.75	3.25	4.00	4.50	4.75
	7-8	1.75	2.00	2.50	3.25	4.50	5.50	6.50	7.75	8.75
WEIGHT UP TO:		**16 Kg.**	**18 Kg.**	**20 Kg.**	**22 Kg.**	**24 Kg.**	**26 Kg.**	**28 Kg.**	**30 Kg.**	
YOUR	1-3	3.25	3.50	4.00	4.25	4.50	5.00	5.50	6.00	
ZONE	4-6	5.50	6.00	6.50	7.25	7.25	8.00	8.50	8.75	
	7-8	10.00	11.00	12.00	13.00	14.00	15.00	16.50	17.25	

Table C — Air Mail Shipment

WEIGHT UP TO:		.5 Kg.	1 Kg.	2 Kg.	3 Kg.	4 Kg.	6 Kg.	8 Kg.	10 Kg.	12 Kg.
	1-3	2.25	2.50	3.25	4.00	5.00	6.50	8.00	10.25	11.00
Z	4	2.25	2.50	3.25	4.00	5.00	6.50	8.00	10.25	11.00
O	5	2.25	2.50	3.25	4.00	5.00	6.50	8.00	10.25	12.00
N	6	2.50	3.00	3.75	4.50	5.75	7.75	10.75	11.75	14.00
E	7	2.50	3.00	3.75	4.50	5.75	7.75	10.75	13.00	15.00
	8	2.75	3.25	4.25	5.25	7.25	9.00	12.00	14.25	17.00
WEIGHT UP TO:		**14 Kg.**	**16 Kg.**	**18 Kg.**	**20 Kg.**	**22 Kg.**	**24 Kg.**	**26 Kg.**	**28 Kg.**	**30 Kg.**
	1-3	13.25	15.25	17.00	19.00	21.00	21.00	25.00	27.00	29.00
Z	4	13.25	15.25	17.00	19.00	21.00	22.00	27.00	27.00	29.00
O	5	13.25	15.25	19.00	20.00	22.00	24.00	29.00	30.00	31.00
N	6	16.00	19.00	22.00	22.00	25.00	27.00	30.00	32.00	34.00
E	7	16.00	20.00	24.00	25.00	28.00	30.00	33.00	35.00	38.00
	8	20.00	22.00	26.00	27.00	31.00	33.00	37.00	43.00	44.00